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Juncus tenuis Willd. and some of its North American Allies

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Several years ago while working over the forms of *Juncus* occurring in the flora about Ithaca, N. Y., the writer was led to the conclusion that there are really several good species included in the *tenuis* group instead of only one or two as most writers have heretofore affirmed. Since that time many field notes have been accumulated, and these together with the information derived from a large series of herbarium specimens have led to the results presented in the present paper.

Juncus tenuis and its allies may be treated in either of two ways. They may all be referred to one or two composite specific types as has heretofore been done by most authors, including Buchenau in his elaborate monograph of the genus; or the composite types may be broken up into their component parts. The latter method seems more proper since the lines of development are all quite distinct, and the various forms really represent separate kinds of plants. The endeavor has been to treat these forms as conservatively as possible, admitting new species only when appearing quite distinct and when represented by a sufficient number of specimens to guarantee constancy of characters. This has led to the result that in a few cases quite diverse forms are still united under one species. Some of these quite likely will be raised to specific rank when more material is available.

The characters used, it will be seen, are in many cases quite different from those commonly employed for the separation of species of *Juncus*. Considerable stress has been placed upon the

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vegetative characters, especially those referring to the sheath and its auricles as well as upon the leaf-blade, perianth and capsule. The seeds have not been found of great service since in this group except in one or two cases they are very much alike. Neither has the density of the inflorescence served definitely to distinguish species, since in many species this seems to be influenced greatly by the conditions of growth, soil, exposure, etc. The species are all perennial and all have six stamens, consequently these characters are omitted from the following descriptions.

Through the kindness of Professor Robinson it was possible to supplement the Cornell Herbarium material with all the material in the Gray Herbarium. The New England Botanical Club also loaned many specimens from the Eastern States, and Mr. M. L. Fernald placed at the writer's disposal a large mass of material from various localities in Maine.

Synopsis of the Species

Sheaths covering one half the length of the stem or more; perianth parts obtuse, equaling or shorter than the 3-celled capsule. 1. *J. Gerardi.*

Sheaths covering only about one fourth of the stem; perianth segments acute or pungent.

Seeds long-caudate; leaves terete, bracts scarcely exceeding the stramineous inflorescence; perianth (3.5–4.5 mm.) equaling the oblong 3-celled capsule. 2. *J. Caseyi.*

Seeds not caudate.

Capsule longer than the small (2.5–3 mm.) perianth, 3-celled; leaves terete, bracts much exceeding the fuscous cyme. 3. *J. Greenei.*

Capsule equaling or shorter than the commonly larger (2.5–5 mm.) perianth; leaves various.

Leaves flat but often involute, cross-section lunate.

Auricles at summit of sheath membranous, whitish, scarcely scarious, rarely produced beyond the insertion; capsule 3-celled or nearly so; perianth scarcely spreading, often appressed.

Perianth small (2.5–4 mm.), equaling the capsule.

Flowers conspicuously secund, 2.5–3.5 mm. long; capsule oval; plant slender with close sheaths; bract shorter than the cyme. 4. *J. secundus.*

Flowers scarcely secund, 3–4 mm. long; capsule ovate-oblong; plant taller and stouter, much looser sheaths; bracts 2, exceeding the cyme. 5. *J. interior.*

Perianth larger (4.5–5 mm.), exceeding the capsule.

Plant stout, 4–7 dm. high; anthers and style very short. 6. *J. Arizonicus.*

Plant more slender, 3 dm. high; anthers linear, exceeding the filaments; styles often 1–1.5 mm. long. 7. *J. Georgianus.*

Auricles scarious, whitish, conspicuously produced beyond the point of insertion.

Capsule oblong, often narrow, 3-celled, equaling the perianth or nearly so, segments of the latter erect or appressed, cyme not crowded.

Stem stout; leaves short and broad (1.5–2 mm.); perianth 4 mm. long, scarious at the base, very acute, stramineous; cyme somewhat open. 8. *J. brachyphyllus.*

Stem slender; leaves narrow and longer; perianth 3.5–4 mm. long, scarious to the apex, acute, not pungent, fuscous; flowers few, densely congested. 9. *J. confusus.*

Capsule ovate or oval, 1-celled, three-fourths the length of the perianth or less, segments of the latter more or less spreading.

Flowers fuscous, congested; perianth parts nearly erect, 4–5 mm. long; capsule oval, firm; plant very stout, with conspicuous broad sheaths. 10. *J. occidentalis.*

Flowers greenish, distant (rarely congested); perianth conspicuously spreading, 3–4.5 mm. long; capsule ovate-oval, thin-walled; plant more slender. 11. *J. tenuis.*

Auricles cartilaginous, yellowish-brown; inflorescence greenish, small, usually congested; perianth spreading; capsule ovate, thin-walled. 12. *J. Dudleyi.*

Leaves terete, barely grooved on the upper side; inflorescence brownish, usually open; auricles nearly cartilaginous; capsule ovate, 1-celled; perianth spreading. 13. *J. dichotomus.*

1. JUNCUS GERARDI Loisel. Journ. d. Bot. 2: 284. 1809

J. bulbosus Bigelow, Torrey and Pursh. Not L.

Stems loosely tufted, rather stout and strict below, 3–6 dm. high, slightly compressed, slender at the summit: leaves erect or spreading, flat or slightly involute, grass-like, nearly equaling the culm; sheaths 4–6, all blade-bearing, the lower loose, the upper close and reaching the middle of the stem or even higher, margins and small auricles membranous: inflorescence small, 2–7 (rarely 12) cm. long, many-flowered, open but not diffuse, ultimate branches short, bearing 1–2 flowers at the extremity; bracts usually equaling the inflorescence; bracteoles ovate-subrotund, small, rounded: perianth small, 2.5–3 mm. long, the parts dark-fuscous with green midrib, nearly equal in length; the outer linear, convex, apex obtuse and incurved, margins narrowly scarious; the inner oval obtuse with broadly scarious margins: stamens nearly as long as the perianth, anthers linear, much exceeding the filaments; style

long and stout, stigmas very long: capsule broadly oval or obovoid, rounded above and strongly apiculate, equaling or slightly exceeding the perianth, placentae meeting at the axis or nearly so: seeds broadly oblong (.5–.6 mm. × .3–3.5 mm.), short-blunt-pointed at each end, marked with 12–15 distinct longitudinal ridges, the spaces between inconspicuously reticulated.

Salt marshes along the coast from Newfoundland to Florida, also inland in central New York, and on the Pacific Coast at Vancouver Island (Macoun). Specimens were examined from nearly all parts of this region.

In America this is a very distinct species seeming to be quite constant in its characters over our whole region, but in Europe *J. compressus* Jac. is so close a relative as to make distinction difficult. The position of the leaves upon the stem and the short blunt perianth divisions form two very conspicuous characters, and by these it may be distinguished from all other species treated in this paper.

2. JUNCUS VASEYI Engelm. Trans. St. Louis Acad. Sci. **2**: 448. 1866

Stems more or less tufted, tall and stiff, erect, rather slender (3–8 dm. high), nearly terete: leaves very long (25–40 cm.), about ¾ length of culm, rigid and erect, terete, the groove very shallow or wanting; blade-bearing sheaths commonly only one, rarely two, short, rather close, the margins and short auricles semi-membranous, not scarious, lower sheaths bladeless and purple: inflorescence small, rather crowded (10–35 mm. long), branches erect, each with 2–4 sessile scattered flowers; bracteoles obtuse and rounded: perianth 3.5–4 mm. long, green or stramineous, rigid, the parts erect or appressed, equal and similar, lanceolate, all acute and narrowly scarious margined: stamens one half the length of the perianth, anthers linear-oblong, nearly as long as the filaments: stigmas short, sessile or nearly so: capsule 4–5 mm. long, oblong-cylindrical, obtuse, slightly exceeding the perianth; placentae meeting at the axis: seeds .85–1.10 × .1–.15 mm. including the tail, sigmoid-spindle-shaped, caudate at each end, the tails over one half the length of the body, marked with about 15 very low longitudinal anastomosing ridges, not reticulated between.

Moist shores and wet woods, Maine and Ontario along the lakes to the Saskatchewan, Iowa and Colorado. Specimens examined from various places both in the East and in the West.

Easily distinguished from other allies of *J. tenuis* by the

spindle-shaped, distinctly caudate seeds, to which character must be added the terete leaves and fuscous oblong capsules slightly exceeding the perianth. *J. Vaseyi* and *J. Greenei* form a distinct and easily recognized group among the forms of grassy-leaved *Junci*.

3. JUNCUS GREENEI Oakes & Tuck. Am. Journ. Sci. **45**: 37. 1843

Perennial, tufted : stem stiff and erect, quite stout, 3–7 dm. high, terete, strongly grooved : leaves half as long as the culm or less, flexuous, terete, the groove deeper than in the last ; at least two sheaths blade-bearing, loose, not scarious : auricles very short, thickish : inflorescence short (2–5 cm. long), crowded and many-flowered, fuscous : bracts long and flexuous, much exceeding the culm, filiform, spreading or reflexed ; bracteoles short, rounded : perianth small (2.5 mm. long), fuscous, the parts all nearly similar, triangular-subulate, acute, broad and short, midrib green, margins broadly scarious : stamens 6, one half the length of the perianth, anthers oblong-linear, equaling the filament : style very short and stout, stigmas short : capsule narrowly oblong-ovate, obtuse, much longer than the perianth, placentae meeting at the axis : seeds oblong (.48–.54×.20 mm.), apiculate at each end, coarsely reticulated, longitudinal ridges inconspicuous.

In damp woods or grassy places, New Brunswick to New Jersey near the coast, and sparingly through the lake region to Wisconsin. Specimens examined from Maine, Massachusetts, Rhode Island, New Hampshire, Vermont and Michigan.

4. JUNCUS SECUNDUS Beauv. ; Poir. Encyc. Suppl. **3**: 160. 1813

J. tenuis secundus Engelm. Trans. St. Louis Acad. Sci. 2, 450. 1866.

Densely tufted, slender, wiry, strict and erect (3–5 dm. high): culm nearly terete, strongly 6–8-grooved above, light green : leaves densely tufted, flat, one third length of culm or less, short and very narrow ; sheaths narrow (2 mm. wide or less) the upper rather close, margins and rounded auricles membranous, not scarious, all blade-bearing ; bracts one (rarely two), setaceous, shorter than the medium-sized (3–8 cm. long) open inflorescence ; branches of the latter strongly ascending, 3–7-flowered, conspicuously secund : bracteoles ovate-oblong, scarious, obtusish or cuspidate : perianth stramineous, rather small (2.5–3.5 mm. long), the parts erect or only slightly spreading, all similar, broadly lance-

subulate, acute, midrib green, margins moderately scarious: stamens two thirds length of the perianth, anthers oblong-linear, slightly exceeding the filament: capsule oval-oblong, obtuse, scarcely apiculate, nearly equaling the perianth; placentae meeting at the axis: seeds oblong or ovate, irregularly curved, apiculate at each end (.28–.37 × .14–.17 mm.), with about 12–14 rows of transversely oblong shallow areoles.

Dry soil, Massachusetts to North Carolina along the coast.

Specimens examined:

MASSACHUSETTS: Medford (Boott, 1872); Winchester (G. P. Huntington, 1879).

RHODE ISLAND: (Olney).

PENNSYLVANIA: Lancaster (Porter and Leidy, Junc. Bor. Am. Engelm. no. 23, 1866).

DELAWARE: New Castle Co. (W. M. Canby, 1874).

NEW YORK: Pine Plains (L. H. Hoysradt, 1878).

In general appearance *J. secundus* is very distinct. It is especially characterized by the slender culm bases, membranous auricles, tufted leaves, short bracts, small secund flowers, scarcely spreading perianth, long anthers and placentae meeting at the axis. It seems to be confined to the Atlantic coast, while the Mississippi Vally forms heretofore ascribed to it are to be referred to a distinct species, *J. interior*.

5. **Juncus interior** sp. nov.

Tall and rather stout (5–10 dm. high), light green: stem erect, nearly terete, coarsely grooved: leaves several, about one third length of culm, blades narrow (1–1.25 mm. wide), flat or involute: sheaths nearly all blade-bearing, large and loose, margin and short rounded auricles membranous, often slightly yellowish: inflorescence large and open, very many flowered, 3–10 cm. long, branches conspicuously ascending: flowers distant and scattered, not secund, pale stramineous: bracts commonly two, exceeding the inflorescence: bracteoles acuminate: perianth 3–4 mm. long, its parts nearly equal, broadly subulate, very acute, scarious margin narrow, extending on the inner to the tip, all appressed or erect: stamens one half the length of the perianth: anthers short-oblong, much shorter than the filaments: styles very short: capsule oblong or rarely ovate-oblong, obtuse, barely apiculate, equaling the perianth; placentae not quite meeting at the axis except at the ends: seeds oblong, rather small (.35–.50 × .14–.17 mm.), apiculate at both ends, shallowly areolate.

Illinois to Wyoming, in dry woods and prairies.

Specimes examined:

ILLINOIS: Richmond (Vasey in Gray Herb.; type), between Urbana and Centralia (Vasey), Athens (E. Hall,—Junc. Bor. Am. Engelm. no. 21); Illinois Dr. Mead, no. 23.

WYOMING: Grand Enchantment Creek (A. Nelson, no. 3982, 1897).

Juncus interior has previously constituted the main part of the so-called *J. secundus* of the Mississippi valley. Closer observation shows however that it is quite distinct as well in structure as in area of distribution. *J. secundus* is always a slender plant with rather close sheaths, while the present species is commonly tall and stout with much broader sheaths. The two species also differ in the larger inflorescence of the latter, with larger flowers which are not secund, shorter anthers and more oblong capsule. The bracts also much exceed the inflorescence, while in *J. secundus* they usually do not.

6. **Juncus Arizonicus** sp. nov.

Sparingly tufted, tall and stout (4–7 dm. high), erect and rather stiff, quite pale; culm terete or slightly compressed, coarsely grooved: leaves ⅓–½ the length of the culm, large, broad and flat, rarely involute, sometimes lax (often 1 mm. wide); sheaths numerous and conspicuous, nearly all blade-bearing, very loose and papery, often expanded, stramineous or brownish, margins and rounded auricles membranous, scarcely scarious: inflorescence stramineous, many-flowered, open but rather crowded (4–7 cm. long), the branches erect; bracts 2–3 foliaceous, much exceeding the inflorescence; bracteoles strongly cuspidate: flowers large and rather distant: perianth large (about 5 mm. long), the parts lance-subulate, rigid and very acute, nearly equal, erect or appressed, rarely at all spreading: stamens about one half the length of the perianth; anthers elongated-oblong, about equaling the filament: style very short: capsule rather narrow, ovate-oblong, obtuse, barely apiculate, triangular above, firm in texture, conspicuously shorter than the perianth; placentae meeting at the ends and nearly so at the middle: seeds oblong or ovate, irregularly curved (.30–.37 × .17–.21 mm.), apiculate, marked with about 12–14 rows of shallow transversly oblong areoles.

Arizona and New Mexico.

Specimens examined:

N. MEXICO: Copper Mines (Geo. Thurber, type in Gray Herb.); N. Mexico (A. Fendler, no. 856).

ARIZONA: Apache Pass (Lemmon, no. 310).

Juncus Arizonicus curtiflorus var. nov.

Commonly more slender, sheaths frequently closer: leaves nearly filiform: inflorescence smaller (3–5 cm. long): flowers smaller, perianth only 4 mm. long, scarcely exceeding the broader and shorter, more ovate capsule; placentae more widely separated.

Arizona, New Mexico and Texas. Possibly a distinct species.

Specimens examined:

ARIZONA: Flagstaff (D. T. MacDougal, no. 305, type in Gray Herb.).

NEW MEXICO: (C. Wright, no. 1922).

TEXAS: Houston (E. Hall, no. 661, 1872).

Intermediate in some respects between *Juncus confusus* and *J. tenuis;* differing from the former in its membranous auricles, larger perianth, comparatively shorter capsule, open stramineous inflorescence, and stouter habit; and from the latter in its membranous auricles, more oblong firm-walled capsule, scarcely spreading perianth, and erect branches. It is one of the largest species of this group. The tall stout culms are densely clothed at the base with the numerous papery and very loose sheaths. Some of the specimens differ markedly in their smaller flowers and other characters, thus warranting their separation as a distinct variety as above.

7. JUNCUS GEORGIANUS Coville, Bull. Torr. Club, **22**: 44. 1895

Densely tufted, 3 dm. high, erect, but somewhat weak, slender: culms striate-grooved, nearly terete: leaves very numerous, rather long (⅓–½ length of culm), blade narrow, quite thick and rigid, but flattish with a broad open groove, coarsely striate on the back; sheaths close except the lower which are bladeless and expanded, all greenish-stramineous, margins membranous, auricles short, rounded, membranous, or slightly cartilaginous in some cases, not scarious: inflorescence large for the plant (6–10 cm. long), very lax and distantly flowered: bracts filiform, equaling the inflorescence or usually much shorter: bracteoles ovate, acute: perianth 4.5–5 mm. long, the parts nearly equal, lance-subulate, very acute, midrib green with a fuscous stripe on each side and a narrow

scarious margin extending to the tip of the inner parts: stamens about one half the length of the perianth: anthers long-linear, much exceeding the filament: style quite long (1 mm.) for this group: capsule about three fourths length of the perianth, narrowly oblong-lanceolate, obtuse or broadly acute, mucronate, 3-celled: seeds about .4–.5 mm. long, oblong, reticulated, the areoles linear and transversely arranged in about sixteen longitudinal rows.

Georgia, Stone Mountain (Canby, Small), Little Stone Mountain (Small).

Specimen examined:

Stone Mountain, Georgia (Canby in Gray Herb.).

The above description of this extraordinary *Juncus*, with the exception of the part relating to the fruit, was drawn from a portion of the type material in the Gray Herbarium. This was in the flowering condition, and the fruit characters were added from Mr. Coville's original description.

The species seems to be very local in distribution having been found only in the limited locality given above, where it was first discovered by Mr. Canby, and later according to Mr. Coville was again collected by Dr. Small. In general appearance it is not very different from *J. tenuis*, but lacks the scarious auricles while the very long anthers and style designate it as a very anomalous form for this group where all other species except *J. Gerardi* have short anthers and styles.

8. **Juncus brachyphyllus** sp. nov.

Culm stiff, erect and very stout, 4–5 dm. high (1.25–1.5 mm. diam.), slightly compressed, very conspicuously grooved; leaves short, ¼–⅓ the length of the culm, the blade unusually broad and flat but rather thick, stiff and spreading (1.5–2 mm. wide), rarely at all involute; sheaths all but the lowest blade-bearing, loose and mostly free, pale, margins membranous, auricles produced and mostly scarious: inflorescence short, crowded, many-flowered (2–6 cm. long), stramineous, the branches ascending, sometimes elongated to 2.5 cm., sometimes all capitate; bracts 2–9 cm. long, leaf-like, usually exceeding the inflorescence; bracteoles acute or cuspidate: perianth rather large, the parts appressed, 5 mm. long, slightly unequal, subulate, very acute, narrowly scarious toward the base, inner scarious all around: stamens about one half the length of the perianth; anthers oblong nearly

equaling the filament: styles short (.5 mm. long): capsule firm, rather narrowly oblong, triangular above, obtuse or retuse, equaling the perianth; placentae completely meeting at the axis: seeds quite large, oblong (.5–.55 × .2 mm.) rather slender and strongly, often obliquely, apiculate at each end, areolate.

Arkansas to Idaho.

Specimens examined:

ARKANSAS: (Between Morka and Red Fork) (Marcy's Exped. Herb. G. Thurber); Upper Platte (Hayden in Gray Herb. type).

IDAHO: (Lake Waha) (Heller, no. 3410, 1896).

The limited material of this species makes its range rather doubtful. It is closely related to *Juncus confusus* in flower and fruit characters, indeed differs from that species only in its more acute perianth segments, more open paler inflorescence, and especially in the stout culm and short broad leaves. It differs from *J. interior* in the large scarious auricles and larger perianth.

9. JUNCUS CONFUSUS Coville, Proc. Biol. Soc. Wash. **10**: 127. 1896

Strict but slender, 4–5 dm. high, erect, light green: culms moderately grooved, sparingly tufted: leaves very narrow, nearly filiform, two thirds the length of the culm or less, flat and unusually thick, commonly also involute; sheaths short, narrow, close, some of the lower bladeless and looser, yellowish-white, margins and produced auricles scarious, the latter whitish: inflorescence very short, compact, capitate (.5–2 cm. long), pale fuscous; bract 2–7 cm. long, filiform, exceeding the inflorescence; bracteoles large, ovate, scarious, obtuse or acutish: perianth small (3.5–4 mm. long), the parts nearly equal, appressed, lanceolate, acutish, stramineous with a fuscous stripe on each side, margins all rather broadly scarious to the apex: stamens one-half the length of the perianth: anthers oblong, shorter than the filament: styles quite short: capsule firm, oblong, a little shorter than the perianth, conspicuously triangular and retuse at the apex, placentae completely meeting at the axis: seeds large, oblong, apiculate and often oblique at the ends (.45–.50 × .2 mm.), coarsely and shallowly areolate.

Colorado to Montana and possibly Idaho.

Specimens examined:

COLORADO: (Hall and Harbour), Chicken Creek (Baker, Earle and Tracy, no. 742, 1898).

WYOMING: Battle Lake (A. Nelson, no. 4004), Laramie Peak (A. Nelson, no. 1631).

Juncus confusus includes all of the so-called *J. tenuis* var. *congestus* of the Rocky Mountain region except that here ascribed to *J. brachyphyllus*. It differs from the true *J. tenuis congestus* Engelm. (*J. occidentalis*) in its more slender habit, longer capsule, smaller flowers and more congested heads, and from *J. brachyphyllus* in its much denser heads, more slender habit, and especially in its narrow leaves and fuscous perianth. It seems rather widely distributed but does not appear abundantly in the herbaria.

10. **Juncus occidentalis** (Coville) nom. nov.

J. tenuis congestus Engelm. Trans. St. Louis Acad. Sci. **2**: 450. 1866. Not *J. congestus* Thuill.

J. tenuis occidentalis Coville, Proc. Biol. Soc. Wash. **10**: 129. 1896.

Tall, stiff and erect (3–6 dm. high), from a stout base, pale green; stem nearly terete, finely striate; leaves one third to one half the length of the culm, numerous and densely tufted at the base, rather coarse, flat and flexuous, 1–1.5 mm. wide; sheaths all blade-bearing, loose and expanded, brownish, the margins and short auricles whitish and scarious: inflorescence several- or many-flowered, glomerate or more commonly somewhat open (1.5–3 cm. long), fuscous; bract one, leaf-like, about 5 cm. long, exceeding the inflorescence; bracteoles broadly ovate, obtuse or mucronate: perianth large (4–5 mm. long), the parts lance-subulate, slightly unequal in length, erect or somewhat spreading, fuscous with green midrib and rather broad scarious margin extending to the apex, the inner more broadly scarious and with a narrower midrib: stamens one half the length of the perianth, anthers oblong, much shorter than the filaments: styles very short: capsule firm, broad, ovate-oval or oblong-oval, obtuse, when mature strongly retuse, not over three fourths the length of the perianth, fuscous, placentae extending only about one half way to the axis: seeds oblong or irregular, apiculate at each end (.34–.43 mm. long), areolate-reticulated, not striate.

Central California to Oregon.

Specimens examined.

CALIFORNIA: (Bolander, also Oakland Hills, no. 417, and no. 23), Berkeley (J. W. Blankinship), Bolinas Bay (A. Kellogg, Junc. Bor. Am. Engelm. no. 22), Redwood Hills, Watsonville (A. Wood, 1868), Yosemite Val. (Torrey, no. 534, 1865), Sonoma Co. (J. W. Congdon) (Kellogg and Harford, no. 1043).

OREGON: Klamath Co. (E. I. Applegate, no. 748), Waldo (Howell, 1884).

Differs from *Juncus tenuis* in the larger, fuscous, congested flowers with scarcely spreading perianth, more oval and firmer capsule, stouter, taller stem with more numerous basal leaves, and from *J. confusus* in its short capsule and coarser leaves. It sometimes becomes quite robust, in which case the inflorescence may become more open. In general, this species is decidedly more strict than *J. tenuis*.

It differs from its closest relative, *Juncus brachyphyllus*, in its larger, fuscous, more spreading perianth, much shorter retuse oval capsule, which is only three fourths the length of the perianth, the placentae not meeting at the axis, and the seeds not being quite so long. It agrees with *J. confusus* in having the same retuse apex to the capsule and very scarious margins to the perianth segments, but the whole flower is much larger.

11. JUNCUS TENUIS Willd. Sp. Pl. **2**: 214. 1799

J. bicornis Michx. Fl. Bor. Am. **1**: 191. 1803.

Tufted, rather low, bright green: culms 2–6 dm. high, commonly spreading, slightly flattened and finely striate, often stout: leaves long, one half to nearly the full length of the culm, narrow (1–1.25 mm.), lax, flat and soft, rarely slightly involute; sheaths all blade-bearing, short, loose and often expanded, greenish-brown, margins and the large extended auricles (often 1.5 mm. long) very scarious: inflorescence pale green, many-flowered, moderately open (1–7 cm. long), flowers somewhat aggregated near the ends of the very unequal branches: bracts 2 rarely 3, foliaceous, much exceeding the inflorescence: bracteoles triangular-ovate, acutish: perianth variable in size (3–4.5 mm. long), parts all nearly similar but the inner slightly shorter, lanceolate, very acute, green with white-scarious margins, conspicuously spreading: stamens one half the length of the perianth; anthers short, oblong, much shorter than the filament: capsule thin-walled, broadly ovoid, shorter than the perianth, obtuse, very obscurely triangular above, scarcely apiculate: placentae not reaching half way to the axis: seeds (.33–.40 × .14–.17 mm.) oblong, bluntly apiculate at each end, reticulated, areoles large, transversely oblong.

Dry roadsides and grassy places, Newfoundland to Florida and westward to Texas, northwestward to Oregon and Washington.

Specimens examined:

NEWFOUNDLAND: (Robinson and Schrenk, no. 130).

QUEBEC: (Mrs. Sheppard, 1827).

MAINE: Many localities (Fernald, Parlin, Furbish).

NEW HAMPSHIRE: Jaffrey (B. L. Robinson, nos. 174, 303).

MASSACHUSETTS: Many localities about Boston (N. E. Bot. Cl., Gray Herb.).

RHODE ISLAND: (Olney), Providence (J. F. Collins).

CONNECTICUT: (L. Andrews, no. 189), New Haven (J. A. Allen).

NEW YORK: Many specimens from near Ithaca.

PENNSYLVANIA: Lancaster (Porter in Gray Herb., also Junc. Bor. Am. Engelm. no. 20).

VIRGINIA: Princess Anne Co. (Heller, no. 1070).

NORTH CAROLINA: Swain Co. (Beardslee and Kofoid).

SOUTH CAROLINA: (Ravenel).

FLORIDA: (A. H. Curtiss, no. 2985).

LOUISIANA: (J. Hale).

MICHIGAN: Keweenaw Co. (O. A. Farwell, no. 468a), Port Huron (C. K. Dodge, no. 27).

MINNESOTA: Mille Lacs Co. (E. P. Sheldon).

ARKANSAS: (F. L. Harvey, no. 24).

IOWA: Stone City (R. Combs & C. R. Ball, no. 414).

IDAHO: Nez Perces Co. (Sandberg, MacDougal and Heller, no. 379).

WASHINGTON: Pullman (Piper); Seattle (Piper, no. 1134), Chehalis Co. (Heller, no. 4074), near var. *anthelatus*.

OREGON: (E. Hall, no. 540).

Juncus tenuis anthelatus var. nov.

Tall and rather stiff (5–9 dm. high); leaves broader; sheaths numerous and loose, often causing the base of the stem to appear very stout: inflorescence very large, open and diffuse (5–15 cm. long), the flowers more scattered and, except in a few cases, smaller (2.5–3.5 mm. rarely 4 mm.): capsule not over three fourths the length of the perianth, round-ovate, shining, rarely larger.

Maine to Florida and Texas, mostly along the coast; possibly also in the State of Washington.

Specimens examined:

MAINE: Hartford (J. C. Parlin), Orono (M. L. Fernald).

MASSACHUSETTS: Lexington (C. H. Knowlton).
VIRGINIA: Carroll Co. (Small).
SOUTH CAROLINA: (M. A. Curtis).
TEXAS: Houston (E. Hall, no. 663).
MISSOURI: Butler Co. (H. Eggert).

This is much more common and more widely distributed than any other species in the group, being especially abundant throughout the eastern United States. Although Willdenow's type has not been studied there seems little doubt from the locality and description given that it really was of this species. The more diffuse habit, scarious auricles, many-flowered inflorescence with flowers mostly near the ends of the branches, spreading sepals, and thin-walled one-celled capsule make *J. tenuis* a very distinct species indeed. It is, however, very variable and future study may separate several more good species. In Washington and Oregon the perianth shows a tendency to become fuscous, although never so dark as in *Juncus occidentalis* and *J. confusus*.

The var. *anthelatus* seems to be distinct from *J. tenuis* var. *laxiflorus* E. Fisk. Ber. d. Schles. Gesells. 168, 1890.

11. **Juncus Dudleyi** sp. nov.

Pale green: stems tufted, often very large and stout, 3–10 dm. high, stiff, erect and wiry, prominently striate-grooved: leaves short, one half the length of the culm or usually less, narrow but flat, frequently involute; sheaths rather close, all blade-bearing, margins not scarious, auricles rounded, thick and cartilaginous, yellowish or reddish in color: inflorescence small and rather dense 2–5 (rarely 7) cm. long, few-flowered, exceeded by the short filiform 4–8 cm. long bract: flowers contiguous at the ends of each branchlet, not at all secund, green or pale-stramineous; bracteoles ovate, obtuse or acutish; perianth 4–5 mm. long, the parts firm, nearly equal, lance-subulate, acute, strongly spreading, yellowish-green with a distinct scarious margin: stamens one half as long as the perianth, anthers oblong, slightly shorter than the filaments: style very short: capsule broadly ovate-oval, ¾–⅞ the length of the perianth, rounded apiculate and very obscurely triangular at the apex, placentae reaching half way to the axis: seeds oblong (.37–.45×.17–.21 mm.), apiculate at each end, coarsely areolate with 5–7 rows of transversely oblong areoles.

Damp soil in open places, from Maine and New York westward to the Saskatchewan, Colorado and Arizona.

Specimens examined:

MAINE: Aroostook Co. (Fernald, no. 109, K. Furbish), Kennebec Co. (Fernald, no. 2747), Somerset Co. and Orono (Fernald).

VERMONT: (Eggleston & Churchill, no. 404), Willoughby (G. G. Kennedy).

NEW YORK: Ithaca (Dudley and others); Truxton (K. M Wiegand, Cornell Herb., type); also many other localities.

MICHIGAN: Detroit (Wm. Boott, C. F. Wheeler), Keweenaw Co. (O. A. Farwell, no. 468b).

WISCONSIN: (J. A. Lapham).

MISSOURI: Dixon Co. (F. Clements, no. 2598), Springfield (S. Weller).

KANSAS: Riley Co. (J. B. Norton, no. 528).

NEBRASKA: Hooker Co. (Rydberg, no. 1374), Thomas Co. (Rydberg & Wright, nos. 1845 and 1487).

WYOMING: Lander (A. Nelson, no. 699).

IDAHO: Boise (A. I. Mulford).

COLORADO: Mancos (Baker, Earle & Tracy, no. 424).

ARIZONA: Willow Spring (F. Palmer, no. 550).

The cartilaginous brown auricles, stiff stem and small contracted inflorescence with spreading calyx distinguishes this species from all others of the group. In the vicinity of Ithaca, N. Y., it is quite common, and may be found either in damp open meadows along water courses or preferably in marly soil in which latter situation it reaches its greatest perfection. In the Cayuga Flora Professor Dudley refers to this species as an unnamed variety of *J. tenuis* with tall stems and crowded glomerate heads occurring on the moist meadows of Marl Creek.

Juncus Dudleyi is extremely variable in size, although the floral characters are constant. The largest specimens are coarse, tall and robust with looser sheaths, thinner auricles and more open inflorescence; but all gradations may be found down to the very slender low forms with close sheaths and capitate flowers. These extremes may all be found about Ithaca, N. Y.

13. JUNCUS DICHOTOMUS Elliott, Bot. S. Car. and Ga. 1: 406. 1817

Sparingly tufted, very stout, especially at the base (7–9 dm. high), strict, dark green: culms terete or flattish, shallowly striate:

leaves very long (two thirds the length of the stem) and commonly stout, nearly terete, rarely much channelled; sheaths usually all more or less distinctly blade-bearing, very loose and broad, brownish or purple, margins and rounded auricles almost cartilaginous, not scarious: inflorescence many-flowered, rather large and normally diffuse, rarely contracted, 2–8 cm. long, more or less fuscous; bracts 5–15 cm. long, similar to the leaves, either longer or shorter than the inflorescence; bracteoles acutish, often fuscous: perianth 3.5–4 mm. long, the segments spreading, pungent, nearly equal and similar, greenish-brown with a narrow scarious margin: stamens one half the length of the perianth, anthers oblong, shorter than the filaments: style very short: capsule ovate oblong, rounded, minutely apiculate and very obscurely triangular at the apex, ¾–⅞ the length of the perianth; placentae extending half way to the axis: seeds nearly as in *J. tenuis*.

In dry or wet sandy places, Massachusetts to Florida along the coast.

Specimens examined:

MASSACHUSETTS: Chelsea Beach (H. Mann).

NEW JERSEY: Atsion (J. A. Allen), Keyport (G. Thurber), Camden (C. F. Parker, Herb. Junc. Bor. Am. Engelm. no. 24).

DISTRICT OF COLUMBIA: (M. S. Bebb).

VIRGINIA: Princess Anne Co. (Heller, no. 1068).

SOUTH CAROLINA: (G. Thurber, M. A. Curtis), Aiken (Ravenel, Herb. Junc. Bor. Am. Engelm. nos. 25 and 26).

GEORGIA: Summit of Stone Mt. (J. K. Small).

FLORIDA: Apalachicola (Dup. Chapman Herb. Biltmore, no. 2615a), Jacksonville (A. H. Curtiss. nos. 2969 and 5660), Lake Co. (Nash, nos. 555, 1086 and 1881), Middle Fla. (G. Thurber).

Very similar to *Juncus tenuis* but seems to differ strangely from all other forms in the combination of pale fuscous flowers and terete leaves, the latter character apparently being quite constant. The sepals are strongly spreading as in *J. tenuis*, and it also goes through the same characteristic variations as that species in the condensation and expansion of the inflorescence. The extremes are quite unlike in appearance but not essentially different in structure. Small stunted forms are also commonly wiry, slender and strict with filiform leaves. This condition is well exhibited by the two specimens from Lake Co., Fla. (Nash), which are both low and very slender with narrow sheaths. They seem

however to be connected with the ordinary form by numerous transitional specimens especially in the South. A peculiar specimen from Florida and also one from Massachusetts has the auricles and floral characters of this species but possesses more or less distinctly flattened leaves. In case the leaves are slightly flattened *Juncus dichotomus* may still be easily distinguished from *J. tenuis* by the thick auricles, general dark color and sheaths which are commonly tinged with purple. From *J. Dudleyi* it may be known by the diffuse inflorescence with darker flowers and by the purple sheaths.

CORNELL UNIVERSITY.

Studies on the Rocky Mountain Flora—II

By P. A. Rydberg

THE ROCKY MOUNTAIN SPECIES OF MELANTHACEAE

There has been a great deal of misunderstanding regarding the species belonging to the family Melanthaceae (perhaps more commonly regarded as a sub-family of Liliaceae). Especially is this true with respect to the species growing in the Rocky Mountain region. In order that some of the confusion may be cleared up and a way may be opened to further study of the group my present views are here offered.

The family is represented in the Rockies by at least five genera and seventeen species. Of these I have found myself obliged to describe one genus and seven species as new. The genera are as follows:

TOFIELDIA Huds.

This is represented by three species, distinguished as follows:

Stem glabrous, scapose; seeds unappendaged. *T. palustris.*

Stem viscid-pubescent at least above; seeds appendaged.

Bractlets broadly triangular, connate for two thirds of their length. *T. intermedia.*

Bractlets lanceolate-triangular, connate half their length or less. *T. occidentalis.*

TOFIELDIA PALUSTRIS Huds. Fl. Ang. Ed. 2, 1: 175

A subalpine species of wet places, growing in America from Greenland to Alaska and from the Arctic coast south to Quebec and British Columbia. It is also found in subarctic Europe. The following specimen from the Rockies is in the New York Herbaria:

BRITISH COLUMBIA: Rocky Mountains, 1890, *John Macoun.*

Tofieldia intermedia sp. nov.

Tofieldia glutinosa Hook. Fl. Bor. Am. **2**: 179, in part. 1838. Wats. Bot. Calif. **2**: 184. Not Pursh.

A slender perennial with more or less leafy stem, 1.5–3 dm. high, viscid-pubescent above. Leaves 5–20 cm. long, 2–5 mm. wide, obtuse or acute: raceme short, dense, 1–2 cm. long: bracts

broad, ovate: pedicels usually 3 together, very short, in fruit 1–4 mm. long: bractlets under the flowers 3, broadly triangular, connate for about two thirds their length: flowers yellow: sepals obovate, 4–5 mm. long: petals somewhat narrower and longer: capsule ovoid, about 5 mm. long: beaks about 1 mm. long, spreading: seeds appendaged.

This has been confused with the eastern *T. glutinosa* Pers. which has an elongated raceme, longer pedicels, and oblong subequal sepals and petals, about 4 mm. long. All specimens from the west referred to *T. glutinosa* may belong to *T. intermedia*. At least all that I have seen do so. *T. intermedia* grows in bogs to an altitude of 2,700 m. from Saskatchewan to Alaska, British Columbia and Wyoming. The following specimens belong to it:

ALASKA: Sheh-Shooh Lake, 1895, *M. W. Gorman, 78* (type); Yes Bay, 1895, *Thos. Howell, 1666;* Khantaak Island, 1892, *F. Funston, 47;* Sitka, *Bongard.*

BRITISH COLUMBIA: Summit of Selkirk Mountains, 1890, *John Macoun.*

WASHINGTON: Totoish Mountains, 1897, *O. D. Allen 274.*(?)

MONTANA: Flathead River, 1892, *R. S. Williams, 915;* Granite, 1892, *Kelsey;* Upper Marias Pass, 1883, *Canby, 328.*

WYOMING: Cement Creek, 1897, *F. Tweedy, 336.*

TOFIELDIA OCCIDENTALIS Wats. Proc. Am. Acad. **14**: 283. 1879

This species is distinguished from the preceding by the narrower, less connate bractlets, longer pedicels, narrower sepals, larger capsule, 8 mm. long, and longer ascending beaks. The following specimen from the Rocky Mountain region is in the New York Herbaria.

BRITISH COLUMBIA: Avalanche Mountain, 1890, *J. M. Macoun.*

XEROPHYLLUM

This genus is represented by two species:

Petals and sepals 7–10 mm. long.	*X. tenax.*
Petals and sepals 4–6 mm. long.	*X. Douglasii.*

XEROPHYLLUM TENAX (Pursh) Nutt. Gen. Am. **1**: 235. 1818

Helonias tenax Pursh Fl. Am. Sept. 243. 1814.

X. Douglasii Rydb. Mem. N. Y. Bot. Gard. **1**: 92; not Wats.

This has been greatly confused with the following. Watson stated that *X. Douglasii* was collected on the Hayden Surveys of the Yellowstone Park, but does not cite any locality in the Rocky Mountains for *X. tenax*. Coulter in his Manual of the Rocky Mountain Region included consequently a description of the former, but none of the latter. As this book is the one most used by Rocky Mountain botanists, all specimens of *Xerophyllum* from that region have therefore been labeled *X. Douglasii*. I made the same mistake in preparing my Catalogue of the Flora of Montana. All the specimens cited there belong to *X. tenax* instead of *X. Douglasii*. Besides the Montana specimens there cited, the following Rocky Mountain specimens belong to this species:

BRITISH COLUMBIA: Toad Mountain, Kootenay Lake, 1890 *J. M. Macoun.*

IDAHO: Kootenay Co., 1888, *J. H. Saunders;* Wiessner's Peak, 1892, *Sandberg, MacDougal & Heller, 588.*

XEROPHYLLUM DOUGLASII Wats. Proc. Am. Acad. **14**: 284. 1879.

I have not seen any Rocky Mountain specimen of this species, but include it on the authority of Dr. Watson who referred to it the specimens from the Hayden Collection metioned above.

Stenanthella gen. nov.

Erect bulbous glabrous herbs with few narrow leaves and racemose or paniculate perfect greenish, brownish or purplish flowers. Petals and sepals each 3, subequal, withering-persistent, narrowly lanceolate, acuminate, with reflexed tips, and at last involute, without gland and distinct claw. Stamens 6, free, included; anthers reniform, confluently 1-celled. Ovary ovoid, superior; styles 3. Capsule lance-ovoid, 3-beaked, septicidal to the base, wholly superior. Seeds oblong, winged.

Dr. Gray included the species belonging here in *Stenanthium*, but the genus is better defined than many of the recognized genera in the family. In *Stenanthium*, the flowers are polygamous, open, not campanulate in outline, the base of the ovary is inferior, the tip of the petals and sepals not reflexed and the general habit different. The genus *Stenanthella* contains two known species, one from the island Sachalin, **S. Sachalinensis** (*Stenanthium Sachalinense* F. Schmidt), and the following:

Stenanthella occidentalis (A. Gray) Rydb. n. n.

Stenanthium occidentale A. Gray, Proc. Am. Acad. **8**: 405.

The species ranges from Alberta and British Columbia to Oregon and Idaho. The following specimens are from the Rockies:

MONTANA: Deer Lodge, 1892, *Miss Emma Ware;* Flathead River, 1883, *Canby, 332;* Big Blackfoot, *Canby;* divide between Hell Gate and Blackfoot, 1880, *Watson;* Columbia Falls, 1894, *R. S. Williams.*

ALBERTA AND BRITISH COLUMBIA: Rocky Mountains, 1858, *E. Bourgeau;* Kicking Horse Lake, 1887, *John Macoun.*

IDAHO: Kootenay Co., 1890, *J. B. Leiberg, 4912.*

VERATRUM L.

Flowers greenish, bractlets foliaceous, often equaling or exceeding the flowers. *V. viride.*

Flowers white or yellowish white; bractlets membranous, much shorter than the pedicels and flowers. *V. speciosum.*

VERATRUM VIRIDE Ait. Hort. Kew. **3**: 422. 1789

V. lobelianum β Eschscholtzianum R. & S. Syst. **7**: 1555. 1829.

V. Eschscholtzii Gray, Ann. Lyc. N. Y. **4**: 119. 1837.

If the western plant should be included in *V. viride* or not, is doubtful. The eastern plant extends west to Minnesota and the western is found first on the Pacific slope in Idaho and British Columbia. Both are very variable and no good character has been found to separate the two. As a rule the western plant has shorter stamens and bracts; the former scarcely half as long as the petals and sepals. The western range of *V. viride* or *V. Eschscholtzianum*, whatever name it should bear, is from southern Alaska to Oregon and Idaho. The following are the only specimens seen from the Rockies.

IDAHO: Packsaddle Peak, 1892, *Sandberg, MacDougal & Heller, 863.*

Veratrum speciosum sp. nov.

Veratrum Californicum Wats. Proc. Am. Acad. **14**: 277; in part. 1879. Not Durand.

A stout, more or less pubescent, very leafy plant, 1–3 m. high. Leaves, except the uppermost, broadly oval, 2–3 dm. long, 1–2

dm. wide, obtuse or acute, glabrous above, finely soft-pubescent beneath, sessile and sheathing: panicle many-flowered with ascending branches: bracts lanceolate, foliaceous: bractlets membranous, yellowish, ovate, acuminate, shorter than the flowers and pedicels: petals and sepals yellowish white, oval or broadly oblanceolate, mostly obtuse, 5–7-nerved, 8–10 mm. long, 4–5 mm. wide: capsule oblong, about 3 cm. long and 12 mm. in diameter: seeds oblong, 7–8 mm. long with a wide white wing-margin.

In looking over the specimens of *V. Californicum* in the Columbia Herbarium I found one specimen collected in Oregon on the Wilkes' Expedition, which looked very unlike the rest, having a narrower and denser panicle and narrower and more acutish petals and sepals. I took it out and placed it in the cover used for the specimens not named. I found in that cover a similar specimen. On the label was given neither locality nor the collector's name; but on the sheet was pasted a paper with a tracing of the basal leaves, the description of *V. Californicum* E. Durand and some remarks, among others the words "petiole 3–4 inches long." The specimens are presumably a part of the type of *V. Californicum* or at least have been compared with Durand's specimens and the notes made by Durand himself. Durand in his description expressively states that the lower stem-leaves are petioled. As this is never the case in the plant of the northern Rockies and the Columbia Valley, I am certain that the plant generally regarded as *V. Californicum* and from which Dr. Watson's description in his revision was mainly drawn is perfectly distinct from Durand's plant. The latter is a rare plant judging from the fact that I have not seen more than the two specimens mentioned above.

V. speciosum ranges from Montana to Washington, California and Colorado, reaching a maximum altitude of 2,500 m.

MONTANA: Bridger Mountains, 1896, *Flodman, 344* (type); Little Belt Mountains, *344½*; Bozeman, *P. Koch*; Deer Lodge Co., *Emma Ware*; Belt Park, 1886, *R. S. Williams, 475*; Belt Creek, 1883, *Scribner, 287*; Lo-Lo Creek, 1880, *Watson.*

IDAHO: Lake Pend d'Oreille, 1892, *Sandberg, MacDougal & Heller, 741*; Kootenay Co., 1886, *J. H. Sandberg*; Lake Waha, 1896, *A. A. & E. Gertrude Heller, 3380*; 1892, *Isabel Mulford.*

UTAH: Heber Valley, 1869, *S. Watson, 1165*; American Fork Cañon, 1880, *M. E. Jones.*

WASHINGTON: 1889, *G. R. Vasey.*

OREGON: *J. S. Newberry.*

CALIFORNIA: Modoc Co., 1893, *M. S. Baker;* 1865, *H. N. Bolander, 6255;* Mt. Shasta, 1897, *H. E. Brown.*

COLORADO: Pagosa Peak, 1899, *C. F. Baker, 258* (?). (This has smaller flowers, petals and sepals being only 6–8 mm. long.)

ZYGADENUS Michx.

Much confusion has existed in this genus. The species of Colorado, Wyoming and Montana have been variously named *Z. Nuttallii, Z. venenosus* and more rarely *Z. paniculatus,* but much complaint has been made that they do not fit Watson's descriptions. Some have complained that those descriptions have been too narrow, others that there is no line to be drawn between *Z. venenosus* and *Z. paniculatus* and that both those species come to near *Z. Nuttallii.* Dr. Watson's descriptions of *Z. venenosus* and *Z. paniculatus* are unusually good and correct. He knew them both from the field. The common Rocky Mountain plants belong to neither. *Z. venenosus* does not grow east of Idaho and *Z. paniculatus* not east of Utah, while *Z. Nuttallii* is a species of the plains and I doubt that it is found at all in the Rocky Mountain States. The Rocky Mountain species are distinguished as follows:

Gland obcordate; base of ovary inferior.
- Petals and sepals 7–8 mm. long, 7–13-nerved. *Z. elegans.*
- Petals and sepals 5–6 mm. long, 3–7-nerved. *Z. Coloradensis.*

Gland obovate or semi-orbicular; ovary wholly superior.
- Petals and sepals more or less clawed; filaments adnate to the base of the claws.
  - Petals and sepals rounded or obtuse at the apex.
    - Upper leaves without sheaths at the base; both petals and sepals long-clawed and sub-cordate at the base*; gland with a thick margin. *Z. venenosus.*
    - All leaves with distinct sheaths; petals long-clawed and sub-cordate at the base; sepals short-clawed; margin of the gland ill-defined.
      - Petals and sepals 4–5 mm. long; petals ovate; leaves 3–5 mm. wide. *Z. gramineus.*
      - Petals and sepals 6–8 mm. long; petals oblong; leaves 5–9 mm. wide. *Z. intermedius.*
  - Petals and sepals acute or acuminate at the apex; all leaves with sheaths; sepals cuneate at the base and short-clawed.
    - Leaves less than 5 mm. wide; petals and sepals both cuneate at the base and short-clawed. *Z. acutus.*

Leaves over 5 mm. wide.
Raceme simple; petals long-clawed and sub-cordate at the base. *Z. falcatum.*
Raceme branched; petals short-clawed, not sub-cordate at the base. *Z. paniculatum.*
Petals and sepals clawless; gland obovate with a poorly defined margin; filaments free. *Z. Nuttallii.*

ZYGADENUS ELEGANS Pursh, Fl. Am. Sept. **1**: 241. 1814

The typical *Z. elegans* is a western plant, mainly belonging to the Rocky Mountain region, where it grows in meadows up to an altitude of 2500 m. If the eastern plant or *Z. glaucus* of Nuttall, should be included in this species, is very doubtful. It is always darker green, more glaucous, inflorescence more paniculately branched, the petals and sepals narrower and more greenish. It ranges from New Brunswick to Minnesota and south to Vermont. The range of *Z. elegans* proper is from Saskatchewan to Alaska, south to Colorado and Nevada.

Zygadenus Coloradensis sp. nov.

A rather slender glabrous plant, 2–4 dm. high. Bulb ovoid, about 2 cm. long and 1–1.5 cm. in diameter: leaves narrow, erect, about 2 dm. long, 3–5 mm. wide: flowers racemose, yellowish white-tinged with brownish or purplish: bracts linear-lanceolate, all equaling or exceeding the pedicels: petals and sepals 5–6 mm. long, 3–7-nerved, oblong or narrowly obovate, acute: capsule ovoid, 15–18 mm. long and 7–8 mm. in diameter.

Z. Coloradensis is closely allied to *Z. elegans*, differing in the smaller flowers, greener foliage, long and narrow bracts equaling or exceeding the pedicels and a brownish or purplish tint of the inflorescence, bracts and flowers. It grows in the mountains at an altitude of 2500–3500 m.

COLORADO: Idaho Springs, 1895, *Rydberg* (type); Leroux Creek, 1892, *J. H. Cowen;* La Plata, 1873, *Coulter;* Caribou, 1891, *Dr. E. Penard;* Empire, 1892, *H. N. Patterson, 298.*

ZYGADENUS VENENOSUS Wats. Proc. Am. Acad. **14**: 279. 1879

This species is characterized by its narrow leaves, of which the upper lack the scarious sheaths, and by the thick, prominent

* When the petals or sepals are sub-cordate at the base and long-clawed the gland is at the very base but when they are acute at the base the gland is a little higher up on the blade.

glands. It is more slender and strict than all the species except *Z. acutus*, which is easily distinguished by its acute sepals and petals. *Z. venenosus* grows mostly on hillsides at low altitudes, scarcely ascending higher than 2000 m. It ranges from Idaho and British Columbia to California and Utah. The following Rocky Mountain specimens belong here:

UTAH: Parley's Peak, 1869, *S. Watson, 1163.*

IDAHO: Keeley's Hot Springs, 1892, *Isabel Mulford;* Big Potlash River, 1892, *Sandberg, MacDougal & Heller, 319;* Little Potlash River, *404.*

Zygadenus gramineus sp. nov.

Zygadenus venenosus Rydb. Cont. U. Dep. Ag. **3**: 525. 1896. Mem. N. Y. Bot. Gard. **1**: 93 in part. Not S. Wats.

A slender yellowish-green plant, 2–3.5 dm. high. Bulb elongated ovoid, 2–3 cm. long and 1–1.5 cm. in diameter: leaves narrowly linear, scabrous on the margins and the midrib, 1–2 dm. long, 3–5 mm. wide, conduplicate and somewhat falcate, all with distinct scarious sheaths surrounding the stem: racemes rather short: bracts scarious, lanceolate, long-acuminate: flowers light yellow: sepals broadly ovate, obtuse at the apex, acute at the base and very short-clawed: petals ovate, obtuse, subcordate at the base and with claws about 1 mm. long: glands almost semi-orbicular; upper margin toothed, but thin and not well defined: capsule elongated ovoid, 8–10 mm. long, 3–4 mm. in diameter.

Z. gramineus resembles somewhat the preceding, but is lower, of a yellowish color; its stem leaves are evidently sheathed, the sepals are short clawed, not subcordate at the base and the gland thin and without a distinctly thickened upper border. *Z. gramineus* grows on hillsides up to an altitude of 2500 m.; from Saskatchewan and Alberta, south to western Nebraska and Idaho.

MONTANA: Spanish Basin, 1897, *Rydberg & Bessey, 3848* (type); 1896, *Flodman, 343;* Helena, 1891, *F. D. Kelsey.*

IDAHO: Beaver Cañon, 1895, *Rydberg.*

SOUTH DAKOTA: Hot Springs, 1892, *Rydberg, 1051.*

WYOMING: Yellowstone Park, 1888, *Dr. Chas. H. Hall.*

SASKATCHEWAN: 1858, *E. Bourgeau.*

Zygadenus intermedius sp. nov.

Zygadenus venenosus Rydberg, Mem. N. Y. Bot. Gard. **1**: 93 in part. 1900. Not Nutt.

A rather stout light green plant, 3–6 dm. high. Bulb elongated ovoid, about 3 cm. long and 1.5 cm. in diameter: leaves scabrous on the midrib and margins, 2 dm. or more long, 5–9 mm. wide, keeled and sometimes conduplicate; all with conspicuous scarious sheaths at the base: raceme rather long: flowers light yellow; petal and sepals 6–8 mm. long, obtuse; the former broadly ovate, and acute or rounded at the base and short-clawed; the latter oblong subcordate at the base and with a claw 1 mm. long: glands as in the preceding.

Like the preceding but taller and stouter, in habit resembling mostly *Z. paniculatus*, except that the inflorescence is seldom branched. It is easily distinguished from that species by the obtuse petals and sepals and by the distinct claws and the subcordate bases of the petals. It grows on dry hillsides up to an altitude of 2000 m. in Montana, Idaho, Wyoming and Utah.

IDAHO: Nez Perces Co., 1892, *J. H. Sandberg, 10564* (type); Peter Creek, 1892, *Sandberg, MacDougal & Heller, 114;* Lewiston, 1896, *A. A. & E. Gertrude Heller, 3093.*

UTAH: Farmington, 1881, *M. E. Jones, 2091.*

WYOMING: Laramie Hills, 1894, *Aven Nelson, 254.*

MONTANA: Deer Lodge, 1895, *F. N. Notestein;* Bridger Mountains, 1897, *Rydberg & Bessey, 3849.*

Zygadenus acutus sp. nov.

A very slender light green plant, 3–5 dm. high. Bulb rounded ovate, 1.5–2 cm. long, 1–1.5 cm. in diameter: leaves narrowly linear, scabrous on the margin, about 2 dm. long and 4–5 mm. wide, keeled and often conduplicate: flowers pale yellow: petals and sepals 4–5 mm. long; both acute at the apex and at the base, very short-clawed: glands obovate or cuneate; upper margin toothed, thin and not well defined.

In habit closely resembling *Z. venenosus*, but easily distinguished by the acute, short-clawed petals and sepals, which are both cuneate at the base. The only specimens seen are the following:

SOUTH DAKOTA: Box Elder Creek, Black Hills, 1887, *W. S. Rusby.*

Zygadenus falcatus sp. nov.

Z. Nuttallii Porter & Coult. Syn. Fl. Colo. 133. In part. 1874. Not A. Gray.

A rather stout light green plant 3–4 dm. high. Bulbs rounded ovoid, 3–4 cm. long and about 3 cm. in diameter: leaves scabrous, especially on the margins and midribs, 1.5–2.5 dm. long, 5–8 mm. wide, keeled, conduplicate, and generally decidedly falcate, all with scarious sheaths: raceme short, in fruit elongated: flowers yellow: petals and sepals about 5 mm. long, acute; the former deltoid ovate, acute at the base; the latter ovate, sub-cordate at the base and with claws 1 mm. long: glands semi-orbicular, upper margin toothed, thin and not well defined: capsule ovoid cylindrical.

All the specimens cited below have been named *Z. Nuttallii* though the plant is more closely related to *Z. paniculatus*, from which it differs in the distinctly clawed petals which are subcordate at the base. These characters, together with the more distinct glands and the slightly adnate filaments, distinguish it from *Z. Nuttallii*. *Z. falcatus* inhabits the foothills of Colorado at an altitude of about 1500 m.

COLORADO: Fort Collins, 1893, *C. S. Crandall* (type); 1896. *C. F. Baker;* Denver, 1873, *J. M. Coulter.*

ZYGADENUS PANICULATUS (Nutt.) Wats. Bot. King's Exp. **5**: 343, 1871

Helonias paniculata Nutt. Journ. Phila. Acad. **7**: 57. 1834.

It is well characterized by Watson and easily distinguished by its stout habit, generally branched inflorescence, and rhombic-ovate acute and almost clawless petals and sepals. It grows on hills up to an altitude of 1500 m., ranging from Montana and Washington to New Mexico and California. The following Rocky Mountain specimens belong here:

UTAH: Ogden, *Capt. Stansbury;* City Creek Cañon, 1880, *M. E. Jones, 1674.*

IDAHO: Boise, 1892, *Isabel Mulford.*

MONTANA: Grasshopper Valley, 1880, *Watson* (?).

ZYGADENUS NUTTALLII A. Gray, in Wats. Proc. Am. Acad. **14**: 279. 1879

Amianthium Nuttallii Gray, Ann. Lyc. N. Y. **4**: 123.

This is evidently a species belonging to the plains. All the specimens in the Columbia and N. Y. Botanical Garden herbaria are from Arkansas and Kansas. Dr. Watson included Texas and

Colorado in the range. The Texan plant referred here by him, belongs to an altogether different plant. I think that Colorado also should be excluded, believing that all specimens found there and labeled *Z. Nuttallii* belong to *Z. falcatus*, which resembles it most in general habit, but has an altogether different flower.

Another Note on Buxbaumia

R. S. Williams

Since writing the note "Buxbaumia in the United States," which appeared in the July, 1900, number of the *Journal of the N. Y. Bot. Garden*, I have received a specimen of *B. aphylla* from Dr. G. N. Best, collected in the State of Washington, by Professor Piper. It is in every way like the eastern *aphylla*, so that the species ranges from one side of the continent to the other, just as *B. indusiata* does. The remaining species, *B. Piperi*, is still unknown from any region east of the Rocky Mountains, I believe. As stated in the note above referred to, this last is entirely distinct from *B. indusiata* in having one-celled immersed stomata, not two-celled and superficial. All the specimens of these three species that I have ever collected were either growing on decayed logs or on fragments of such logs more or less mixed with earth, but Professor Piper states that he has collected specimens on the sides of comparatively recent railway cuts, growing on earth with apparently no sign of decayed wood mixed in.

N. Y. Botanical Garden.

A Correction

The name *arenicola* having already been used in the genus *Allium*, I therefore substitute the name *Allium sabulicola* for the species published as *Allium arenicola*, in the Bulletin of the Torrey Botanical Club for September, 1900 (**27**: 506).

George E. Osterhout

Dr. Torrey as a Botanist*

By Nathaniel Lord Britton

The botanical work of John Torrey is a grand contribution to science, and among the most permanent of that of all students of the North American flora. Born in New York, Aug. 15, 1796, he was early associated with Major LeConte, who later contributed largely to the literature of the biological sciences, with Dr. David Hosack, who, during Torrey's youth, was engaged in the development of the Elgin Botanical Garden, where Torrey studied under the direction of that eminent physician and naturalist, and he early came into relations with Professor Amos Eaton, the most prominent American botanist of that time. Hosack used to refer to him as "the young man with an old head" and this title was taken up by his class in the College of Physicians and Surgeons, he being called the "old head" of the class.

During his youth he collected and observed plants of the vicinity of New York with great assiduity, and on May 5, 1817, he was appointed by the Lyceum of Natural History, then recently founded, and of which he was one of the original members, in conjunction with Dr. C. W. Eddy and Mr. D'Jurco V. Knevala, as a committee, to prepare a catalogue of the plants growing in the neighborhood of the city. The celebrated Dr. Samuel L. Mitchell was at that time president of the Lyceum. Torrey must have been even then familiar with the flora, for the note book used by him, and on which the catalogue is apparently based, is preserved as one of the most cherished records of his early studies, and the work was presented to the Lyceum for publication, December 22d of the same year. It was actually published at Albany, in 1819, the advertisement bearing date of February 16th, the year following his obtaining his degree of Doctor of Medicine. His botanical studies, therefore, were prosecuted extensively during his medical course of study. He soon became well and

* This article and the two following formed a part of the exercises of Torrey Day, celebrated at the New York Botanical Garden, June 27, 1900, in connection with the Botanical Section of the American Association for the Advancement of Science.

favorably known as a botanist; in 1822, in the preface to the third edition of his "Manual of Botany" Professor Eaton says: "Dr. Torrey, of New York, suggested the most valuable corrections and improvements to be found in this edition. And I believe I may encourage the reader with the hope that the extensive collection of materials in his possession will, very soon, appear before the public in the form of an enlarged system of the botany of the northern States. Such an extended view of the subject would be an invaluable treasure to all lecturers, private teachers, and to all others who are disposed to enter deeply into the study." These statements, it may be remarked, are not alone appreciative of Torrey's work, but indicate considerable generosity on the part of Eaton. In the second edition of "Florula Bostonensis," 1824, Dr. Bigelow refers to Torrey's work as follows: "To students of the present volume who may wish to extend the sphere of their inquiries I have great pleasure in recommending the flora of the middle and northern section of the United states, by Dr. Torrey, of New York, now in the course of publication. The accuracy and constancy of pursuit manifested by this gentleman entitle him to all praise from those who appreciate the amount of perseverance necessary to accomplish labors of this sort."

The work thus heralded by Eaton and Bigelow was published during the year 1824 under the title "A Flora of the Northern and Middle States, or Systematic Arrangement and Description of all the plants heretofore discovered north of Virginia." Dr. George Thurber, on the occasion of his election as President of the Torrey Botanical Club, April 29, 1873, in an inaugural address, in which he presented an account of Torrey's life and work, records that the last pages of this Flora were written on the morning of Torrey's wedding day.

Further appreciation of his early work is shown in the writings of other contemporary botanists. In the second volume of the "Sketch of the Botany of South Carolina and Georgia," 1814, Dr. Stephen Elliott says, that to Dr. John Torrey, of New York, he is indebted for many of the plants of New Jersey and New York, for an opportunity of comparing many doubtful species, and of ascertaining many of the plants of Pursh, which were to him uncertain or obscure. Dr. William Darlington in "Florula

Cestrica," 1826, remarks, "After this catalogue went to press I had the good fortune to commence an occasional correspondence with that distinguished naturalist, Professor Torrey, of West Point, which correspondence has, to me, been a source of instruction and pleasure—alloyed only by a regret that I had not earlier enjoyed that advantage. For the information, and specimens, received from him, I beg leave here to offer my sincere and grateful acknowledgements."

Interest centered about this time among botanists on the availability for practical purposes of teaching and the arrangement of floras, of the "Natural System" of Jussieu, as elaborated and modified by Lamarck, DeCandolle, Lindley, and other European authors. Eaton, had, already in the earlier editions of his Manual, referred to this topic, but did not adopt the innovation. The first American edition of Lindley's "Introduction to the Natural System of Botany," was edited by Torrey and published in New York in 1831, and to it he appended a "Catalogue of North American Genera of Plants arranged according to the Orders of Lindley's Introduction to the Natural System of Botany, with the number of species belonging to each genus so far as they are at present determined." Torrey thus gave to American students the first comprehensive view of the system as applied to their own plants, and, like most other suggestions for a radical change of method, it was received with some consternation. Eaton says of this book, in the sixth edition of his Manual, 1833, "Since Dr. Faustus first exhibited his printed bibles in the year 1463, no book has, probably, excited such consternation and dismay as Dr. Torrey's edition of Lindley's Introduction to the Natural System of Botany. And to make the horrors of students, as well as of ordinary teachers, still more appalling, Dr. Torrey's Catalogue of American Plants at the end of his Lindley, was so singularly presented that it would seem to indicate an awful catastrophe to all previous learning." And Eaton never did accept it in his books, though he discussed it at great length at this point and subsequently; neither did Bigelow. It was accepted, however, with minor modifications by Dr. Lewis C. Beck in his "Botany of the Northern Middle States," published at Albany in 1833, and later by Darlington. Torrey and Beck were, therefore, the Ameri-

can leaders in this forward step, and there can be no doubt that if their lives could have been extended into the period of the next overturn of taxonomy by the development of the revolutionary line of thought, that they would have promptly accepted the Eichler and Engler systems of to-day. Naturally, all Torrey's subsequent writings were based on this so-called Natural System.

Dr. Torrey early became especially interested in the Cyperaceae, and accumulated collections of sedges very extensive for the time. His studies were presented to the Lyceum of Natural History in 1836, and published during the same year in the Annals under the title "Monograph of North American Cyperaceae." He did not publish much additional on the family, however, though he kept a copy of the paper posted up, which has been of much service to subsequent students. In fact the great mass of miscellaneous specimens which now began to pour in on him from all over the country, and especially the determination and description of much of the material obtained by the numerous government exploring expeditions, the preparation of the Flora of the State of New York, and of the Flora of North America, the latter in conjunction with Dr. Asa Gray, who made the acquaintance of Torrey while serving as Curator of the Lyceum as early as 1831, left him no time for the monographing of groups. In fact his only other considerable treatment of a large group is the "Revision of the Eriogoneae," jointly with Dr. Gray, published in 1870.

He was appointed Botanist of the Geological Survey of New York, at its organization in 1836. In the prosecution of his duties in this capacity he was aided by all the botanists resident at that time within the State, in bringing together the voluminous material which was published in 1843 as "A Flora of the State of New York," in two large quarto volumes, illustrated by 161 plates, a work which stands to-day as the most noteworthy, elegant and complete presentation of a local flora of any produced in the United States. It is recorded that he had to purchase a copy of this work in order to secure one, such restrictions having been made by those in charge of its publication. A roll of proof sheets was found subsequently, however, and given by Dr. Torrey to Dr. Thurber, who in 1873 said of them, "handsomely bound, it is one of the prized works in my library, and is unique as being

the only copy in existence 'presented by the author.'" This copy is now the property of Professor Byron D. Halsted, and through his courtesy we are able to exhibit it to you to-day.

During the progress of this great work on the flora of New York, the Torrey and Gray "Flora of North America" was also in preparation. Dr. Gray says of this "Early in his career Dr. Torrey had resolved to undertake a general Flora of North America, or at least of the United States arranged upon the natural system, and had asked Mr. Nuttall to join him, who, however, did not consent * * * It was in the year 1836 or 1837 that he invited the writer of this notice—then pursuing botanical studies under his auspices and direction—to become his associate in the Flora of North America." The first part of the first volume was published in July, 1838, the second in October, 1838, the remainder of the first volume in 1840; the first part of the second volume in 1841, the second in the spring of 1842, and the third, the last of February, 1843. Dr. Gray further remarks "from that time to the present, the scientific exploration of the vast interior of the continent has been actively carried on, and in consequence new plants have poured in year by year in such numbers as to overtask the powers of the few working botanists of the country, nearly all of them weighted with professional engagements. The most they could do has been to put collections into order in special reports, revise here and there a family or a genus monographically, and incorporate new materials into older parts of the fabric, or rough hew them for portions of the edifice yet to be constructed. In all this Dr. Torrey took a prominent part down almost to the last days of his life."

Remarking on the suspension of publication of this great desideratum Dr. Thurber says: "Its authors pursued the best course; instead of giving their time to the completion of the flora and allowing the new materials to pass—as they inevitably would have done—into the hands of European botanists, they turned their attention to studying and recording them. Now these discoveries of American plants are mainly recorded by American botanists in American publications, and to secure this result it was well that the *Flora* was suspended." With the further prosecution of the plan of Torrey, subsequent to his death, by Dr. Gray and

his assistants and successors at Harvard University we are all familiar; the first part of "Synoptical Flora of North America" appeared in 1878, and during twenty-two years a small part of the field has been covered. The work is one of stupendous magnitude, and the amount of new material yet being collected in nearly all parts of the country still pours in, placing the present endeavor in much the same difficult position as the one faced by Torrey and Gray in 1843. The extensive studies of the lower plants have brought a new element into the problem, and our territorial extension another one, while still another is apparent in the critical studies of American botanists on the flora of the continent south of the Rio Grande, this latter making it almost necessary that the descriptive botany of Central America should be written by American botanists. The systematic North American Botany of the future, may then readily be foreseen to cover the continent in its broadest definition, not excluding the West Indies. How this may be accomplished in a reasonable space of time, is a problem to which the attention of all North American botanists may advantageously be given.

During the two decades subsequent to 1843, Dr. Torrey's studies were mostly concentrated upon the determination and recording of the botanical results of the numerous expeditions sent out to the far West by the United States government, and in this work he was associated with Dr. Gray, Dr. Newberry and others. He worked up the collections of Nicollet, Frémont, Emory, Stansbury, Marcy, Sitgreaves, Pope, Beckwith, Gunnison, Whipple, Williamson, Parke, and Ives, as well as the enormous collections made by Parry, Wright, Bigelow, and Schott on the survey of the United States and Mexican Boundary.

Shortly after the publication of the Botany of the Mexican Boundary in 1859, Dr. Torrey transferred his herbarium and botanical library to Columbia College, and for the next ten years he was chiefly occupied in herbarium work. A large part of the herbarium was mounted by himself, and his constant observations are recorded in the great number of sketches of floral dissections with which it is enriched; in fact most of his critical studies on plant morphology are thus recorded by his pencil. He was in this work accurate and painstaking to an astonishing degree; the

identification of the specimens actually examined by him leaves nothing to be desired. His last published works are the "Revision of the Eriogoneae," jointly with Dr. Gray, and "Phanerogamia of Pacific North America" issued in 1874, subsequent to his death, which occurred on March 10, 1873.

Dr. Torrey's botanical correspondence was very voluminous, and much of it is preserved both at Columbia and at Harvard. He was in correspondence with practically all the prominent taxonomists of his time. He was little given to argument, criticism or discussion, and, while difficult to divert from a course once determined upon, there is little left to show that he was acrimonious or unpleasant to any of his contem poraries. Even with the original and discursive Constantine Schmalz Rafinesque, whose letters to Torrey extend from 1819 to 1840, friendly and peaceful relations were evidently maintained. An extract from one of Rafinesque's letters written at Philadelphia in 1838 is of interest in this connection:

"My good friend. Your letter of 25th Jan'y was delivered by Dr. Gray quite lately with the 3 small pamphlets. I now send you some pamphlets of mine also, in which you will see that I have been engaged in various labors for a year past and it is a wonder that I could attend to Botany all the while as an amusement and relaxation, if you knew all what I had to attend to last year, in order to bring forth at last my great labors and prepare the means for future activity in the midst of pecuniary difficulties and disappointments. But with zeal and patience I overcame all at last and I have long ago concluded 600 pages of my supplemental Flora and Flora Telluriana or 6 parts. If I had not undertaken these two works together, the first would have been completed ere now, but will be ere 1840. As it is quite a mantissa and you do not admit my improvements, we shall not clash in the least. But between 10 and 20 years hence you will admit of all my discoveries and new genera as you now begin to do for those of 1808 to 1825. * * * I have published so many works that I dont know which you lack yet. I send most of them and a list to the Lyceum for the series of their Annals brought me by Dr. Gray. We had some botanical conversation together and I find he calls himself a lumper, like you, belonging to the putting off school of

knowledge, although his writings are expansive and dive into the invisible anatomy of plants. It is that putting off school that is now impeding the Exploring Expedition, as it is impeding the rapid progress of knowledge in all the sciences but times bring on the due changes and improvements in spite of all delays. As usual your old friend,'&c. C. S. RAFINESQUE.

Such, in brief was the botanical lifework of the man whose memory we meet to honor. When we consider that his profession was medicine, and his livelihood chemistry, he having lectured on that science at West Point, New York and Princeton during the period of his greatest botanical activity, as well as occupying the post of United States assayer in New York, we can but wonder that he could have accomplished so much.

His life and works have been the principal inspiration which has enabled his associates and successors to uphold the cause of botany in New York, and to that inspiration may be referred the long and honorable record of the Club which bears his name, and through it, by the coöperation of civic and private philanthropy, the development of the institution where we meet to-day.

A bibliography of the writings of Dr. John Torrey is hereto appended.

A Catalogue of Plants growing spontaneously within thirty Miles of the City of New York. 8vo, pp. viii, 100. With a supplementary page by Amos Eaton. Prepared by John Torrey, C. W. Eddy, and D'Jurco V. Knevala a committee of the Lyceum of Natural History of New York. Albany, 1819.

Notice of the Plants collected by Prof. D. B. Douglas during the Summer of 1820 around the Great Lakes and the Upper Waters of the Mississippi. Am. Journ. Sci. **4**: 56–69. 1822.

Description and Analysis of a new Ore of Zinc. Am. Journ. Sci. **5**: 235–238. 1822.

Description of a new Species of *Usnea* (*U. Acharises*) from New South Shetland. Am. Journ. Sci. **6**: 104–106. 1823.

Description of some new or rare Plants from the Rocky Mountains, collected by Dr. Edwin P. James. Ann. Lyc. N. Y. **1**: 30–36. 1824.

Notice of a Locality of Yenite in the United States. Ann. Lyc. N. Y. **1**: 51. 1824.

An Account of the Columbite of Haddam (Connecticut) with Notices of several other North American Minerals. Ann. Lyc. N. Y. **1**: 89–93. 1824.

Flora of the Northern and Middle Sections of the United States, or Systematic Arrangement and Description of all the Plants heretofore discovered north of Virginia. Vol. 1, pp. xii, 297–518. New York, 1824.

Descriptions of some new Grasses. Ann. Lyc. N. Y. **1**: 148–156. 1824.

Monograph of the North American Species of Carex (with L. D. de Schweinitz). Ann. Lyc. N. Y. **1**: Part II. 1825.

Compendium of the Flora of the Northern and Middle States, containing Descriptions of all of the Plants exclusive of the Cryptogamia north of the Potomac. 8vo, pp. 403. New York, 1826.

Some Account of a Collection of Plants made during a Journey to and from the Rocky Mountains in the Summer of 1820 by Edwin P. James, M.D., Assistant Surgeon, U. S. Army. Ann. Lyc. N. Y. **2**: 161–254. 1827. Also reprint "Account of a Collection," etc., New York, 1827.

An Introduction to the Natural System of Botany. By John Lindley. First American Edition with an Appendix, by John Torrey. 8vo, pp. 393. New York, 1831.

Catalogue of North American Genera of Plants. (From the first American Edition of Lindley's "Introduction to the Natural System of Botany.") 8vo, pp. 22. New York, 1831.

Monograph of the North American Cyperaceae. Ann. Lyc. N. Y. **3**: 239–244. 1836.

Notes on some American Minerals. Ann. Lyc. N. Y. **3**: 9–86. 1836.

Flora of North America, containing Descriptions of all Plants north of Mexico (with Asa Gray). 8vo, Vol. 1: pp. 711. 1838–1840. Vol. 2: pp. 504. 1841–1843.

Experiment on the Condensation of Carbonic, Sulphurous and Chrochromic Acid Gases. Am. Journ. Sci. **35**: 374, 375. 1839.

Notice of a Flora of North America. Am. Jour. Sci. **41**: 275–283. 1841.

Catalogue of Plants in U. S. War Department Topographical Engineering Bureau: Report to illustrate a Map of the Hydrographical Basin, 143–165. Washington, 1843.

Flora of the State of New York, containing Descriptions of all Plants discovered in the State with their economical and medicinal Properties. 2 volumes, 4to. Albany, 1843.

Botany of Nicollet's Report.

Catalogue of Plants collected by Lieut. Frémont in his Expedition to the Rocky Mountains (in the year 1842). Senate Document, 174, pp. 83–98. Washington, 1845.

Descriptions of some new Genera and Species of Plants collected in Capt. J. C. Frémont's Exploring Expedition to Oregon and North California in the Years 1843–44 (with J. C. Fremont). In Rep. of Exp., pp. 311–319. *4 pl.* Washington, 1845.

Botany of the Emory Expedition. In Rep. of Exp., App. 2: 135–156. *pl. 1–12.* Also List of Plants collected by Lieut. Abert, App. 6: 406–414. Washington, 1848.

Discovery of the Vauquelinite, a rare Ore of Chromium in the United States. Ann. Lyc. N. Y. **4**: 76–79. 1848.

An Account of several new Genera and Species of North American Plants. Ann. Lyc. N. Y. **4**: 80–90. 1848.

Catalogue of Plants of the State of New York, of which Specimens are preserved in the Cabinet at Albany. 2d Rep. Reg. Univ. N. Y. 41–64. Albany, 1849.

On some new Plants discovered by Col. Frémont in California. Proc. Amer. Assoc. Adv. Sci. 1850: 190–193.

On the Structure and Affinities of the *Genus Batis* Linn. Proc. Amer. Assoc. Adv. Sci. 1850: 405, 406.

Observations on the *Batis maritima* Linn. Smithson. Contr. **6**: 1854.

On the *Darlingtonia Californica*, a new Species of Pitcher Plant from Northern California. Smithson. Contr. **6**: 1854.

Plantae Fremontianae, or Descriptions of Plants collected by Col. J. C. Frémont in California. Smithson. Contr. **6**: 1–24. *pl. 1–10.* 1854.

Catalogue and Description of Plants collected on Stansbury's Expedition to the Great Salt Lake. Expl. Surv. Valley of the Great Salt Lake of Utah, by Howard Stansbury, 383–397. Philadelphia, 1852.

Botany of the Sitgreaves' Expedition down the Zuni and Colorado Rivers. In Rep. of Exp., pp. 155–178. *20 pl.* Washton, 1854.

Report on the Botany of the Pope Expedition from the Red River to the Rio Grande, Pac. R. R. Rep. (with A. Gray) **2**: part 2: 159–185. *10 pl.* Washington, 1854.

Description of the plants collected during the Marcy Expedition to the Red River of Louisiana. In Rep. of Exp. 267–289. *20 pl.* Washington, 1854. Senate Executive Document, 33d Congress. Two editions of this were issued.

Botanical Report upon the collections made by Capt. Gunnison, and Lieut. E. G. Beckwith, 1853–1854 (with A. Gray). Pac. R. R. Rep. **2**: 119–132. Washington, 1855.

Sur la Distribution Géographique des Sarraceniacées. Belg. Hort. **6**: 146, 147. 1855.

Whipple Expedition near the 35th Parallel. Descriptions of the general Botanical Collections. Pac. R. R. Rep. **6**: 61–182; *25 pl.* Washington, 1857. [1856 on title page.]

Botany of the Parke Expedition in 1854–1855. List and descriptions of the plants collected by John Torrey. Pac. R. R. Rep. **7**: 9–28. *8 plates.* Washington, 1856. (Synoptical tables of botanical localities, by Thomas Antisell.)

Botany of the Williamson Expedition. Description of the Plants collected along the Route by W. P. Blake, and at the Mouth of the Gila. Pac. R. R. Rep. **5**: 359–370. *10 pl.* Washington, 1856.

Williamson Expedition. Route from Sacramento Valley to the Columbia River in 1854–55. General Catalogue of the Plants collected on the Expedition. I.: Exogenous Plants, by Asa Gray, John Torrey and J. S. Newberry. II.: Endogenous Plants by John Torrey. Pac. R. R. Rep. 6: 65–93. *pl. 11–16.* Washington, 1857.

Botany of the Mexican Boundary. Rep. U. S. and Mex. Bound. Surv. **2**[1]: 27–270; *61 pl.* 1859.

Notice of the California Nutmeg. Journ. Pharm. **3**: 49–51. New York, 1864.

Catalogue of Plants collected during the Exploration of the Colorado River of the West, by Lieut. J. C. Ives, in 1851–58 by

Messrs. Gray, Torrey, Thurber and Engelmann. Report of Exp., Part IV., pp. 30. Washington, 1860.

On *Ammobroma*, a new Genus of Plants allied to *Corallophyllum* and *Pholisma*. Ann. Lyc. N. Y. **8**: 51–56. 1867.

A Revision of the Eriogoneae (with A. Gray). Proc. Amer. Acad. **8**: 145–200. 1873.

Phanerogamia of Pacific North America. Report U. S. Expl. Exp. **17**: 210–514. Philadelphia, 1874.

The Work of the Torrey Botanical Club

By Edward S. Burgess

The final organization of the Torrey Botanical Club under its present name, was on April 29, 1873, the evening of the inaugural address of the second president, Dr. George Thurber. The club had received a previous charter on April 21, 1871. But its first published list of officers and members dates from the previous year, 1870, with which year the publication of its monthly Bulletin commenced. A previous special organization in 1867 proves to have been a re-organization or concentration, knitting together more firmly the members who were meeting as a club, said Mr. Leggett, "at a date not later than 1865," and who were gathering with some regularity for field work, on the local flora, from a time as early as the year 1858, when Dr. Allen, discovering a locality for *Clematis ochroleuca*, brought his prize to Dr. Torrey. From that time on, says Dr. Allen, an informal band of collectors continued to meet for excursions, and formed the nucleus of the club. This nucleus included Dr. Torrey, Dr. T. F. Allen, Mr. W. H. Leggett, Mr. F. J. Bumstead, Mr. James Hogg and brother, Dr. Hyatt and the young D. C. Eaton, afterward professor of botany at Yale. Accepting this latter date of 1858, the club is now 42 years old. Even with this estimate, the club still resembles the lady of the census-taker's story, for the club is still understating its age: said President Thurber, "We have no record of the beginning of the club, its growth was so gradual." The few botanists of the city gathered and visited at the rooms of the Columbia College Herbarium, drawn there by the genial welcome and wide botanical knowledge of its presiding spirit, Dr. Torrey. Visiting botanists naturally sought these rooms. After many meetings by chance, finally came the suggestion to meet by appointment. That suggestion was thought, says President Thurber, to have come from one who was the club's first Vice-President, and whom we enjoy as our senior Vice-President still, the well-known specialist in the Characeae, Dr. Timothy F. Allen.

But behind this date of 1858 there remains the more casual

and informal continuance of friendly botanical association on this island during still earlier years. Botanists have ever been friends, and collecting in company has been one of the pleasant features of their pursuit. Little remains on record, however, regarding early coöperation among botanical workers in New York. Miss Jane Colden (afterward Mrs. Dr. Farquhar), who left a long list of the native plants of the Hudson River region at her death in 1754, had studied with her father, Lt. Gov. Cadwallader Colden, and the father and daughter formed a working partnership in botany, a botanical club of two, which produced the first genuine botanical writing in New York. The next botanist to write of New York, Major John LeConte, publishing his list of the plants on Manhattan Island in 1811, had also pursued his collections in company. One of Dr. Torrey's first recollections is said to have been the sight of two lads coming into the city dusty with tramping and laden with plant-collections. One of these he was told was "the LeConte boy." Soon afterward the Elgin Botanical Garden grew up here under the fostering care of Dr. Hosack; and had it continued it is probable that a botanical club would have developed then. As it was, the Lyceum supplied both meeting-place and a medium of publication for scientific workers, and no botanical club as such developed, though botanical workers still worked in pairs; as witness Torrey himself with Gray in the Torrey and Gray Flora, 1838–43, and, to descend to less important work, the Flora of Central Park, which was also the joint product in 1857 of two workers, Rawolle and Pilat, the latter an Austrian botanist who had become the first Chief-Gardener of Central Park.

The spirit of fraternity and good-fellowship which during the earlier years of Dr. Torrey's life had led to frequent but informal meetings of fellow-workers, and had given them a certain regularity in 1858, reached crystallization in what was termed the Torrey semi-centennial celebration of Dec. 20, 1867, at the expiration of fifty years since Torrey's presentation of his Catalogue of the Plants within 30 miles of New York, to the New York Lyceum (published in Albany 1819, but completed and presented in 1817). This night, which was one of deep snow and typical December storm, was to the select company within, with Dr. Torrey himself as guest of honor, one of the warmest and cheeriest of celebrations, and was

one of the brightest spots in the memories of the early members of the Torrey Club. As already stated, the club at first did not know itself by that name, but appears in print simply as "The Club," 1870, and received its first charter 1871 as the New York Botanical Club, amended next year to its present name, The Torrey Botanical Club. But that it had been for years the intent to call the club by Dr. Torrey's name appears from Mr. Leggett's so entitling the Bulletin when first publishing it in January, 1870.

Dr. Torrey was the first president, then unostentatiously termed chairman, and P. V. LeRoy, his herbarium curator, was the first secretary. In 1870, when the first list was published in the Bulletin, there were 30 members; including one who had just died, Mr. W. W. Denslow, then the chief authority on the flora of the northern part of the island, but whose knowledge was unfortunately not preserved by any printed memoranda.

The Club meetings were then as for many years held in the Columbia College Herbarium on 49th street; they early averaged as many as 17 members present, often also with three or four visitors. The exhibition and discussion of new or unusual species of plants formed a principal part of the decidedly social and cheerful meetings; another feature then prominent was the exhibition of new books; for instance on the evening of February 27, 1872, there were shown among new accessions to the Herbarium Library (together with works by Grisebach, Osten Sacken, Reichard, etc.), the newly received Flora of the Galapagos Islands, by Sir J. D. Hooker, and his Sketches of the Flora of Pennsylvania by our honored fellow member Prof. T. C. Porter.

It was just as the organization of the Club was being perfected that Dr. Torrey passed away. On Jan. 7, 1873, the permanent charter was read and adopted, and on the second meeting for that month, Jan. 29, 1873, Dr. Torrey presided for the last time. He was taken with pleurisy the next day, and though rallying, was not well enough to attend another meeting. To the meeting of February 25th he sent a cheerful note stating his interest, and that he had not in nearly fifty years had a sickness of more than a few days. It was on this evening that he sent to the Club the picture of the Herbarium showing Dr. Torrey sitting at his work, painted by his niece Mrs. Daniell. His death occurred March 10th fol-

lowing, and his funeral at the West Presbyterian Church on 42d street, March 13th, was attended by the members of the Club in a body, each wearing a sprig of "Torreya," among the bearers being Professor Asa Gray, Professor Joseph Henry, and President Barnard of Columbia.

Professor Torrey was succeeded in charge of the Club by Dr. Geo. Thurber, who remained president seven years. The succeeding presidents have been Professor Newberry, ten years, and Judge Addison Brown, also ten years.

The Recording Secretaries have included F. V. LeRoy, 1870+, Dr. Arthur Hollick, also of Columbia University, 1883–1888, Miss Maria O. Steele, 1889+, followed by Dr. H. H. Rusby, of the College of Pharmacy, and by E. S. Burgess, of the Normal College in 1897.

The membership has greatly increased in recent years. The total number of persons who had been recorded as active members at any time was in 1887, 184. The current active membership January, 1885, was 76, rising next January to 89, in 1887 to 106, in 1888 to 114, in 1896 to 191, in January, 1900, to 237; the total present membership, June, 1900, including corresponding members, being 385. Even the active members are scattered widely—one has just gone to Manila, and one is on the Nile.

During these 42 years of its history, the Torrey Botanical Club has formed a continuous nucleus for botanical workers and lovers of plants. It has been a constant stimulus to botanical work in the city and neighborhood. At its meetings the attrition of mind on mind has helped to sharpen botanical interest. One of the most important parts of its work has been its maintenance of field excursions on Saturdays throughout the warmer parts of the year, with the successful introduction last year of such excursions during the winter for collection and study of algae, bryophytes, etc.

In the very earliest days of the Club, as early as 1858, these field excursions, zealously maintained by Messrs. Allen, Bumstead, Eaton, and Leggett, resulted in very thorough exploration of the outlying swamps and hills, as well as very many nearer localities now occupied by city streets. Excursions now reach out through Westchester County, through Long Island and Staten Island, over

northern New Jersey, across into the Pocono plateau of Pennsylvania, and southward into the Jersey Pines. Lists of plants noted during these field days are held in the Club minutes for use toward a permanent catalogue. Among the genera which have received recent additions or corrections as the result of these field days are *Ophioglossum*, *Dryopteris*, *Sisyrinchium* and *Picea*. For some years a joint excursion with Philadelphia botanists has been an annual feature. The pleasurable incidents of recent three-day excursions to the Pocono, the Delaware River, and the Tom's River and Forked River regions will not soon be forgotten by their participants. And to the great effect of these field days in promoting good fellowship among lovers of nature, and stimulating that love of nature to fresh activities, it would be impossible to do justice.

One of the most valued results from the labors of the Torrey Club has been the work of individual members on the local flora. Early local catalogues prepared by members, later than the catalogue by Torrey in 1817, were those on Staten Island by Drs. N. L. Britton and Arthur Hollick, on Stissing Mountain by Lyman O. Hoysradt, on Westchester Co. by O. R. Willis, on Manhattan Island by O. W. Morris, on Central Park by Prof. E. A. Day (the latter two in manuscript) and, in recent months, on Long Island by Dr. S. E. Jelliffe, extending the earlier partial catalogues of E. R. Miller, Henri W. Young and others. Most valuable work contributory to the New York local flora was done by Mr. W. H. Leggett, C. F. Austin, Dr. T. F. Allen and Mr. H. Schrenk in earlier years, and in recent periods by Rev. Mr. Lighthipe, Mrs. Britton, Miss Sanial, Mr. E. P. Bicknell, and especially by Dr. Britton, who is still the head of the club's Committee on the Local Flora.

The "Preliminary Catalogue of Anthophyta and Pteridophyta growing within 100 miles of New York," was the result of the labors of Dr. Britton with Mr. E. E. Sterns and Mr. Julius Poggenburg. A full and definite catalogue with ecological and quantitative features as well as accurate localities, is an end toward which the club is working. Before advancing to this end much work has been done on general nomenclature of North American plants, by N. L. Britton and others, resulting in the present revised catalogue of names of North American plants.

Another feature of the botanical work accomplished through the Torrey Club has been that of monographs on special genera; among which that of *Lechea* early attracted the attention of Mr. W. H. Leggett, who published his first appeal for material in December, 1871, and who was still accumulating great masses of it in 1876, when it was my own privilege to see him and look over the specimens piled upon his library table, and receive from him my first introduction to the Torrey Club. Mr. Leggett's partial publication on *Lechea* was later taken up and revised as is well known, by Dr. Britton.

Another of the earliest members to begin monographic work was C. F. Austin, who began publishing "New Hepaticae" in the Bulletin in 1872, but had already been collecting for many years.

The previous year Dr. T. F. Allen had first published in the Bulletin a call for material on Characeae, March, 1871, and his thirty years' devotion to that order is, as all know, unabated and his primacy undisputed.

Monographic work has since continued to be a leading feature of the activities of the club. It was Dr. Torrey's practice to suggest such work to different members from time to time. It was at Dr. Torrey's suggestion that the studies on Characeae and *Lechea* were undertaken by Dr. Allen and Mr. Leggett; and many similar studies have since been taken up at the suggestion of Dr. Britton. I can but allude in a word to the monographic work since done by Dr. Britton on the Cyperaceae, etc., by Mrs. Britton and Dr. Grout on the Musci, by Dr. M. A. Howe on the Hepaticae, by Miss Anna M. Vail on Asclepiads, by Mr. E. P. Bicknell on *Sisyrinchium*, *Scrophularia*, *Agrimonia*, etc., by Drs. Rydberg on *Potentilla*, Small on *Oxalis*, etc., and Burgess on *Aster*.

Last but perhaps greatest of all the agencies in the work of the Club have been its regular publications, its *Memoirs* now in their tenth volume, commencing 1889, mostly by workers still active in the Club; and its monthly *Bulletin*, once the only botanical journal of our country, begun as a four-page sheet in January, 1870, now reaching about 60 pages monthly; then priced at one dollar a year, and now only at two; long under the editorship of W. H. Leggett, later of W. R. Gerard, afterward of Dr. and Mrs. Britton, and now of Dr. Underwood and reaching out in its influence far over the United States and Europe.

There are other forms of work and many other names of workers who should be given special mention, did time permit. But it certainly would not be fair to the Club to fail to refer to the great work done by its members in publications outside of its own series; as by Dr. Newberry and Dr. Hollick on paleobotany, by Dr. Britton and President Brown in their new "Illustrated Flora" by Dr. Underwood in his works on ferns, hepatics and fungi. And it was from the councils of the Torrey Club that the society of the New York Botanical Garden took its rise.

Reminiscences of John Torrey

By Dr. James Hyatt*

I send a few rather trivial jottings relating to early times in the Torrey Club. To recall my earliest residence in New York city turns my mind back over sixty years ; and now early in my eighty-fourth year, I am reminded of the growing infirmities of life.

It was at Albany, in 1856, that I became a member of the American Association for the Advancement of Science, listening to Agassiz, James Hall, and others, and to Dawson, LeConte, and others, at Montreal in 1857. In my sixteenth year I became interested in plant-studies. Several years previous to 1856 I had seen Dr. Torrey for the first time at his chemical lecture in the College of Physicians and Surgeons in upper Crosby St., and was delighted with his illustrations of osmosis. Not long after I fell into the way of seeing Dr. Torrey rather frequently in the Herbarium of Columbia, at 49th St., bringing him there an *Usnea*, a *Diplopappus*, a *Luzula*, and other plants, to name. At one of my informal calls Mr. Austin was starting out equipped, in February, to collect mosses in North Jersey and Rockland for Sullivant. Before long I began at stated times to meet with Mr. Leggett, the Hoggs, and others, at the Herbarium. Afterward the project was started for incorporation at Albany, a constitution was drawn up, the name Torrey Club selected and the whole submitted to Dr. Torrey. Modestly he struck out Torrey from the title, but the name was afterward reinserted. There were regular club meetings, interesting discussions, the scrutiny of specimens, etc., and as a finish Dr. Torrey furnished, each time, a nice lunch of biscuits and cakes, and a cup of the most exquisite coffee ever tasted. Occasionally a visiting botanist would be present ; sometimes Dr. Gray, or Mr. Redfield from Philadelphia ; and once Professor Boeck of Christiania, who brought us pressed specimens from the Norwegian mountains. Through the Hogg brothers we secured Japanese

* Dr. James Hyatt, of Honeymeadbrook, Bangall, Dutchess Co., N. Y., who, as one of the earliest members of the Torrey Club, was asked to furnish his recollections of Dr. Torrey and the Club.

specimens, especially dwarf maples. *Darlingtonia* was shown from California and the southern species of *Sarracenia*. We received from Dr. Mellichamp the nutmeg hickory and the pecan. Packages of plants were constantly arriving from Dr. Torrey's former students. At one time I learned that a former student seeing Dr. Torrey so much and so constantly at work, said to him, "Dr. Torrey, I don't like to see you doing so much drudgery, here is a thousand dollars, take it and get you an assistant." It was in that way that Mr. LeRoy became curator at the herbarium.

Once deploring to me the rapid and wide encroachments of the city on his wild-plant regions, Dr. Torrey thanked God for the great swamps and mountains which would be barriers to such inroads. His love for wild nature was shown in his selection of a country residence, near the top of a wooded hill in southeastern Rockland County, overlooking the Hudson.

Once I was showing Dr. Torrey, without using it, a little amorphous silicon in a bottle, which I prized, as a mere dust of it had cost me a dollar. To see what he would say, I asked, "Dr. Torrey, what is that?" He looked at it a minute and said: "It appears like ashes." I said, "Suppose it is the most abundant thing in the world that can be made visible?" "Then," said he, "it must be silicon!" When I next called, it was Dr. Torrey's turn to show me specimens. One was tellurium, then more costly than gold, grain for grain. Another was selenium, that proteid element, in a small black shining cylinder. More still to be prized was a tube as large and long as a quill, containing a fine lot of shining crystals of silicon, which had been obtained by Prof. Wolcott Gibbs, of Harvard—who had learned chemistry under Torrey, and, when a lad, had listened to my own chemical lectures at Dr. Muhlenberg's St. Paul's College, near Flushing. After I had admired the specimens to his content, Dr. Torrey said, "Take them along with you." I could not refuse.

Dr. Torrey was for years the chief of the U. S. Assay in Wall St., where he earned more money and had more leisure than ever anywhere else. It was a position of great responsibility. I remember calling at his office in the assay, the Doctor sitting at his desk, while assayers would come in occasionally to report the result of the examination of some mass of gold. On his desk

then was a specimen of Quincy granite, and Dr. Torrey demonstrated to me that it was not syenite.

Now, so far as I am aware, I am the only one who remains of the original members of the club. As these have one by one dropped into the other life a pang has rent me as I realized that I should no more enjoy the profit and pleasure of their companionship; as of Ruger, the most unpretending and one of the most devout, faithful and capable. They were all like Dr. Torrey himself, possessed of the true spirit of a laborer in the fields of the infinities. No man was more kind than Dr. Torrey. He was ever ready to aid the learner, and was in everything as confiding as an ingenuous youth. Dr. Newberry, who followed, was my kind and valued friend, and was of great assistance to me. Professor Alphonso Wood I knew intimately, and worked with him considerably and with profit. He was a kind and most scholarly man, thorough and correct and I do not think he was fairly appreciated.

Finally I send congratulations to every member of the Torrey Club. I salute all those whom I have known. May every success attend them.

BY PROF. THOMAS C. PORTER.

It affords me special pleasure to offer here to-day a slight tribute, in the shape of reminiscences, to the memory of one whom I have long held in high esteem both as a scientist and as a gentleman of noble character.

My first acquaintance with Dr. Torrey began at the meeting of the American Association in Albany, in the year 1850, and his treatment of me, so much younger than himself, was most cordial and friendly. When walking together along the street, he went a considerable distance out of his way in order to show me, growing in a waste place, a very rare plant, specimens of which I collected and still have, *Amaranthus crispus*, a foreigner of uncertain origin.

At another meeting of the American Association, held in Baltimore in the year 1858, Mrs. Lincoln-Phelps, who before her second marriage had published a little volume, amongst the earliest of our floras, and was still as fond as ever of her favorite science,

gave an elegant evening entertainment to the members of the Botanical Section. Her fine mansion was beautifully decorated with ferns, palms and a profusion of shrubs and odorous plants in flower. The assemblage of guests was large, and amongst them I remember Drs. Torrey, Gray, Darlington, and Pitcher, who were exceedingly polite and courteous to the lady of the house and her daughter.

A few years later, Mr. Durand, of Philadelphia, gave a dinner to Drs. Torrey and Gray, then in the city, to which a number of gentlemen were invited, amongst whom it was my good fortune to be included. An amusing incident happened on that occasion. The question was asked why Professor Tuckerman, of Amherst, had been so long silent, and the reply was made that he had been engaged in courting, and had just married a wife. "How was that brought about?" inquired one of the company, to whom another responded, "I suppose he must have taken a great *lichen* to her."

In the year 1867, under the direction of the late Dr. George Thurber, a banquet was held at the Astor House, of this city, in honor of Dr. John Torrey. The guests were numerous and many of them came from a distance, for the celebration was not a local one. In the buttonhole of each could be seen a sprig of *Torreya*. Enthusiasm and good-fellowship prevailed, and the addresses delivered showed that the homage paid to the distinguished botanist was sincere and hearty. The only portion of what was then spoken which has not yet faded from my memory is the conclusion of my own address. I said that Dr. Torrey lived fully up to the famous motto of Linnaeus, *Famam extendere factis.* Void of jealousy, gentle, just to all, loving science for its own sake and averse to controversies and quarrels, he was content to let his excellent work speak for itself.

In the summer of 1870, Dr. Torrey attended the commencement of Lafayette College at Easton, and by his request, and on his recommendation the faculty conferred the honorary degree of Ph.D. on Mr. Bolander, of California. When he left, he invited me and my two daughters to visit him in New York. The invitation was accepted and we reached his dwelling in the Columbia College buildings some time in the month of August. The Doctor

had planned a botanical excursion for us two to Tom's River, New Jersey, whither we went, and entertained by old friends of his, who resided there, devoted several days to exploration over and around Barnegat Bay. Not a few interesting plants were collected, but we failed to find the *Schizaea*, or *Lycopodium Carolinianum*, which usually grows with it. Toward the close of the week, our host and hostess drove us up, seven miles through the deep sand, to the town of Manchester, where we were to pass the night, at the thought of which my heart sank within me, when I saw a dozen or more of the natives seated on benches in front of the inn, each with a branch of a tree or bush, fighting off the bloodthirsty mosquitoes. But my fears were needless. The landlord slipped me into a little back chamber on the ground floor, where wire-screens kept out the insect pests, and I slept soundly.

The next morning Dr. Torrey debated with himself, *pro* and *con*, whether it would be prudent to pay a visit to his botanical friend, Dr. Knieskern, who lived in the neighborhood. The obstacle in the way was this: Dr. K.'s wife cherished an intense dislike to his botanical work and had once opened her mind to Dr. Torrey, and reproached him for encouraging her spouse to waste his valuable time on worthless weeds, to the detriment of his medical practice. He now shrank from again facing such music, and so I lost the opportunity of making the personal acquaintance of Dr. K., whose striking photograph adorns my album, and his *Rynchospora* my herbarium.

Those days of pleasant intercourse can never be forgotten. They enlarged our acquaintance with each other, and I found him uniformly kind, patient, quiet in his manner and yet genial and full of spirit, without assumption and ready to enrich me from his ample stores of knowledge. One thing I remember well. In describing his experiences in California, he said that he had counted 1,200 rings on the felled trunk of one of the giant sequoias, and that those between 6 and 700 years ago were much closer than either before or after, and thus chronicled the slower growth of a century.

It is a matter for regret that, whilst the generic name of this magnificent and long-lived tree on the Sierra Nevada, and of the redwood along the coast, is likely to stand for ages to come in

commemoration of the Indian, George Guesto, the *Torreya* of the Yosemite Valley and of Florida is already superseded by *Tumion*. This, however, cannot obscure the fame of the great botanist. He has other monuments near at hand, just as durable and far more eloquent. Passing by his mountain in the Rockies of Colorado, close to that of Dr. Gray, his name meets us in the title of the Club at whose call we are now assembled, and look where we may, we see everywhere around us fruit from seed sown by a master, for no doubt it is chiefly to his example, inspiration, and labors in the past that Columbia University and the City of New York owe this grand edifice with its thorough equipments, its economic museum, and its extensive herbarium, the superb conservatory opposite, and the broad and beautiful garden and park in the midst of which they stand. Had he foreseen all this in dim prophetic vision his heart would have been gladdened. Had he lived to behold it, his joy would have been greater still.

"Honor to whom honor is due!"

By CHARLES H. PECK, STATE BOTANIST

It was not my good fortune to be personally acquainted with Doctor Torrey, but I none the less have learned to esteem him, and I would emphasize all that has been said here this day in his praise and honor. We all delight to honor the benefactors of our race, whether they are scientists, theologians, philanthropists, statesmen or generals of the army. Dr. Torrey, by his botanical work and leadership, has been a benefactor, not only to the botanists of his day, but also to all those who have or shall come after him. In my work, as his successor, in trying to complete and perfect the State Herbarium, the foundation of which he so well laid, and in trying more fully to elucidate our state flora, I am constantly reminded of him, and in my references to the specimens he placed in the herbarium, and to the plant descriptions he wrote and published in the *New York State Flora*, I seem to be consulting him and looking to him for advice and information, so that my acquaintance with him seems to me to be scarcely less intimate

than that of those more fortunate botanists who associated with him personally and who met him face to face. It is, therefore, a great pleasure to me to unite with you all this day in giving expression to our common feelings of love and admiration of him as a man and a botanist. I doubt not, if he could be with us in this magnificent building, erected as a memorial to him, he would say to us that the warm place he holds in our hearts and the expressions of our esteem and kind remembrance are more precious to him than this great and visible structure, noble and enduring a monument as it is.

Index to recent Literature relating to American Botany

Barker, B. T. P. A Fragment "Mycoderma" Yeast, *Saccharomyces anomalus* (Hansen). Ann. Bot. **14**: 215–244. *pl. 13*. Je. 1900.

Best, G. N. Injury done to Mosses by Insects. Bryologist, **3**: 33. Jl. 1900.

Boodle, L. A. Comparative Anatomy of the Hymenophyllaceae, Schizaeaceae and Gleicheniaceae.—I. On the Anatomy of the Hymenophyllaceae. Ann. Bot. **14**: 455–496. *pl. 25–27*. S. 1900.

Britton, E. G. *Entosthodon Leibergii* sp. nov. Bryologist, **3**: 34. Jl. 1900. [Illust.]

Britton, E. G. *Fissidens grandifrons* Brid. Bryologist, **3**: 28, 29. Jl. 1900.

Britten, J. & Baker, E. G. Notes on *Eryngium*. Jour. Bot. **28**: 241–246. *pl. 411*. Jl. 1900.

Cardot, J. & Theriot, I. New or unrecorded Mosses of North America.—I. Bot. Gaz. **30**: 12–24. *pl. 2–5*. 19 Jl. 1900.

Clute, W. N. Further Notes on mounting Mosses. Bryologist, **3**: 39. Jl. 1900.

Cordley, A. B. Some Observations on Appletree Anthracnose. Bot. Gaz. **30**: 48–58. 19 Jl. 1900. [Illust.]

Dawson, M. On the Biology of *Poronia punctata* (L.). Ann. Bot. **14**: 245–262. *pl. 14–15*. Je. 1900.

Fairchild, D. G. Notes on Travel.—III. Rio and Petropolis, Brazil Bot. Gaz. **30**: 125–130. 15 Au. 1900.

Fernald, M. L. A Revision of the Mexican and Central American Solanums of the Subsection *Torvaria*. Proc. Am. Acad. **35**: 557–562. 12 Je. 1900.

So'anum Madrense, *S. ochraceo-ferrugineum*, *S. Hayesii* and *S. erythrotrichum*, sp. nov.

Fernald, M. L. A Synopsis of the Mexican and Central American Species of *Salvia*. Proc. Am. Acad. **35**: 489–556. 12 Je. 1900.

217 Salvias are recognized, many of them new.

Fernald, M. L. Some undescribed Mexican Phanerogams, chiefly Labiatae and Solanaceae. Proc. Am. Acad. **35**: 562–573. 12 Je. 1900.

New species and varieties in *Pelexia*, *Scutellaria*, *Stachys*, *Calamintha*, *Cuni'a*, *Hyptis*, *Lycium*, *Margaranthus*, *Athenaea*, *Physalis*, *Solanum*, *Datura*, *Cestrum*, *Aster* and *Encelia*.

Fontaine, W. M. Notes on Fossil Plants collected by Dr. Ebenezer Emmons from the older Mesozoic Rocks of North Carolina. Ann. Rept. U. S. Geol. Surv. **20**²: 277–315. *pl. 38–48*. Je. 1900.

Fontaine, W. M. Notes on Mesozoic Plants from Oroville, California. Am. Rept. U. S. Geol. Surv. **20**²: 342–368. *pl. 49–67*. Jl. 1900.

Grout, A. J. Two new species of *Brachythecium*. Bryologist, **3**: 36–39. *pl. 1*. Jl. 1900.

Brachythecium Noveboracense Grout and *B. Washingtonianum* Eaton MSS.

Harper, R. A. Sexual Reproduction in *Pyronema confluens* and the Morphology of the Ascocarp. Ann. Bot. **14**: 321–400. *pl. 19–21*. S. 1900.

Holzinger, J. M. Some new North American Mosses. Bot. Gaz. **30**: 122–125. *pl. 11*. 15 Au. 1900.

Johnson, D. S. On the Endosperm and Embryo of *Peperomia pellucida*. Bot. Gaz. **30**: 1–11. *pl. 1*. 19 Jl. 1900.

Knowlton, F. H. Description of a small Collection of Fossil Wood from the Triassic Area of North Carolina. Ann. Rept. U. S. Geol. Surv. **20**²: 272–274. *pl. 37. f. 1–9*. Jl. 1900.

Describes *Araucarioxylon Woodworthi* and *A. Virginianum*.

Knowlton, F. H. Description of a new species of *Araucarioxylon* from the Cycad Bed of the Freezeout Hills, Carbon County, Wyoming. Ann. Rept. U. S. Geol. Surv. **20**²: 418, 419. *pl. 178. f. 1–6*. Jl. 1900.

Araucarioxylon ? obscurum n. sp.

Knowlton, F. H. Description of a new Genus and Species of Fossil Wood from the Jurassic of the Black Hills. Ann. Rept. U. S. Geol. Surv. **20**²: 420–422. *pl. 179. f. 1–6*. Jl. 1900.

Pinoxylon Dacotense gen. et sp. nov.

Lang, W. H. Studies in the Development and Morphology of Cycadean Sporangia, II. The Ovule of *Stangeria paradoxa*. Ann. Bot. **14**: 281–306. *pl. 17, 18*. Je. 1900.

Lawson, A. A. Origin of the Cones of the multipolar Spindle in *Gladiolus*. Bot. Gaz. **30**: 145–153. *pl. 12*. 15 S. 1900.

Linn, A. *Fissidens hyalinus*. Bryologist, **3**: 28. 1900.

Macoun, J. Note on *Cinclidotus fontinaloides*. Bryologist, **3**: 30. 1900.

Moore, G. T. New or little known unicellular algae. I. *Chlorocystis Cohnii*. Bot. Gaz. **30**: 100–112. *pl. 10*. 15 Au. 1900.

Mottier, D. M. Nuclear and Cell Division in *Dictyota dichotoma*. Ann. Bot. **14**: 163–192. *pl. 11*. Je. 1900.

Murbach, L. Note on the Mechanics of the seed-burying Awns of *Stipa avenacea*. Bot. Gaz. **30**: 113–117. 15 Au. 1900.

Nelson, A. Contributions from the Rocky Mountain Herbarium. Bot. Gaz. **30**: 189–203. 15 S. 1900.

Nelson, E. Some new Species of Wyoming Plants. Bot. Gaz. **30**: 117–122. 15 Au. 1900.

Parkin, J. Observations on Latex and its Functions. Ann. Bot. **14**: 193–214. *pl. 12*. Je. 1900.

Petunnikov, A. Ueber den Wert anatomischer Merkmale zur Unterscheidung der Abies-Arten. Allg. Bot. Zeitsch. **6**: 125–128. 15 Jl. 1900.

Piper, C. V. New and noteworthy northwestern Plants.—IV. Bull. Torr. Club, **27**: 392–401. Jl. 1900.

Reineck, E. M. Floristisches vom Strande von Bahia Blanca (Provinz Buenos Aires, Argent.). Allg. Bot. Zeitsch. **6**: 132–135. 15 Jl. 1900.

Rendle, A. B. New Orchids from Costa Rica. Jour. Bot. **28**: 274, 275.
Pleurothallis Simmleriana and *Physosiphon minor*, sp. nov.

Riley, W. A. Variations in the Maturing of *Plowrightia morbosa* Spores. Bull. Torr. Club, **27**: 287, 288. My. 1900.

Rimbach, A. Physiological Observations on some perennial Herbs. Bot. Gaz. **30**: 171–188. *pl. 13*. 15 S. 1900.

Robertson, C. Another note on the Flower Visits of oligotropic Bees. Bot. Gaz. **30**: 130. 15 Au. 1900.

Robinson, B. L. New Caryophyllaceae and Cruciferae of the Sierra Madre, Chihuahua, Mexico. Bot. Gaz. **30**: 58–60. 19 Jl. 1900.

Rothrock, J. T. Poverty Pine, Table Mountain Pine, Prickly Pine (*Pinus pungens* Michx. f.). Forest Leaves, **7**: 120. *pl.* Ap. 1900.

Rowlee, W. W. North American Willows. Bull. Torr. Club, **27**: 247–257. *pl. 9*: My. 1900.

Schrenk, H. von. A severe Sleet-Storm. Trans. Acad. Sci. St. Louis, **10**: 143–160. *pl. 10, 11.* 12 Ap. 1900.

Sellards, E. H. Note on the Permian Flora of Kansas. Kans. Univ. Quart. Ser. A. **9**: 63, 64. Ja. 1900.

Scott, D. H. & Hill, T. G. The Structure of *Isoetes Hystrix*. Ann. Bot. **14**: 413–453. *pl. 23–24.* S. 1900.

Shear, C. L. Our Puffballs.—III. Asa Gray Bull. **8**: 49–53. *pl. 3.* Je. 1900.

Shove, R. F. On the Structure of the Stem of *Angiopteris evecta*. Ann. Bot. **14**: 497–525. *pl. 28, 29.* S. 1900.

Small, J. K. Notes and Descriptions of North American Plants.—II. Bull. Torr. Club, **27**: 275–281. My. 1900.

Smith, A. M. *Fissidens* in Northeastern North America. Bryologist, **3**: 25–27. Jl. 1900. [Illust.]

Thomas, E. N. Double Fertilization in a Dicotyledon—*Caltha palustris*. Ann. Bot. **14**: 527–535. *pl. 30.* S. 1900.

Timberlake, H. G. The Development and Function of the Cell Plate in higher Plants. Bot. Gaz. **30**: 73–99. *pl. 8, 9.* 15 Au. 1900; **30**: 154–170. 15 S. 1900.

Toumey, J. W. An Inquiry into the Cause and Nature of Crown-Gall. Bull. Univ. Ariz. Agric. Exper. Sta. 33: 7–64. *f. 1–31.* 13 Ap. 1900.

Dendrophagus globosus gen. et sp. nov. (Mycetozoa).

Underwood, L. M. Our Native Ferns and their Allies. Sixth Edition, pp. viii, 158. New York. Jl. 1900.

Includes *Botrychium pumicola* Coville and *Polystichum Lemmoni* sp. nov.

Wager, H. On the Fertilization of *Peronospora parasitica*. Ann. Bot. **14**: 263–279. *pl. 16.* Je. 1900.

Wanner, A. & Fontaine, W. M. Triassic Flora of York County, Pennsylvania. Ann. Rept. U. S. Geol. Surv. **20**^{2}: 233–255. *pl. 21–34.* Jl. 1900.

Ward, L. F. Status of the Mesozoic Floras of the United States. 1st Paper: The Older Mesozoic. Ann. Rept. U. S. Geol. Surv. **20**^{2}: 211–748. *pl. 21–179.* 1900.

Waugh, F. A. & McFarland, J. H. Photography in Botany and in Horticulture. Bot. Gaz. **30**: 204–206. 15 S. 1900.

Webber, H. J. Work of the United States Department of Agriculture on Plant Hybridization. Jour. Roy. Hort. Soc. **24**: 1–18. *f. 1–8.* 1900.

Wiegand, K. M. Some Notes on *Saxifraga* and *Primula*. Bull. Torr. Club, **27**: 388–391. Jl. 1900.

Wiegand, K. M. The Development of the Embryo-sac in some Monocotyledonous Plants. Bot. Gaz. **30**: 25–47. *pl. 6, 7.* 19 Jl. 1900.

Williams, N. *Subularia aquatica*. Meehan's Monthly, **10**: 67, 68. My. 1900.

Williams, R. S. Two new Species of *Grimmia* from Montana. Bull. Torr. Club, **27**: 316, 317. *pl. 19, 20.* Je. 1900.

Woods, A. F. Stigmonose: A Disease of Carnations and other Pinks. Bull. U. S. Dept. Agric. (Div. Vegetable Physiology and Pathology) 19: 6–30. *pl. 1–3. f. 1–5.* 1900.